

Comprehensive Long-Term Environmental Action Navy (CLEAN) II
Contract No. N62742-94-D-0048
Contract Task Order No. 0068

Final Technical Memorandum
Reevaluation of Risk
IRP Sites 8, 11, and 12
Marine Corps Air Station, El Toro, California

Prepared for

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Naval Facilities Engineering Command
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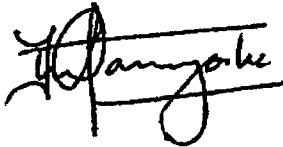
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IRP Sites 8, 11, and 12
MCAS El Toro, California**

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Reviews and Approvals:



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ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
4,4'-DDD	4,4'-dichlorodiphenyldichloroethane
4,4'-DDE	4,4'-dichlorodiphenyldichloroethylene
Bgs	below ground surface
BCT	BRAC Cleanup Team
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
Cal-EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
COPC	chemical of potential concern
CTO	Contract Task Order
DDT	dichlorodiphenyltrichloroethane
DL	detection limit
DON	Department of the Navy
DRMO	Defense Reutilization and Marketing Office
Earth Tech	Earth Tech, Inc.
EPC	exposure point concentration
EPA	Environmental Protection Agency, U.S.
FA	further action
FS	feasibility study
HHRA	human health risk assessment
HQ	hazard quotient
HI	hazard index
IRP	Installation Restoration Program
IWWTP	industrial wastewater treatment plant
MCAS	Marine Corps Air Station
MCPA	2-methyl-4-chlorophenoxy-acetic acid
MCPP	2-(2-methyl-4-chlorophenoxy)-propionic acid
mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	no further action
PACNAVFACENGCOM	Pacific Division, Naval Facilities Engineering Command
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
RI	remedial investigation
ROD	record of decision
SARA	Superfund Amendments and Reauthorization Act
SVOC	semivolatile organic compound
SWDIV	Naval Facilities Engineering Command, Southwest Division
UCL	upper confidence limit
U.S.	United States
USEPA	United States Environmental Protection Agency
WWTP	wastewater treatment plant

1. INTRODUCTION

A human health risk assessment (HHRA) was performed for the Installation Restoration Program (IRP) at Sites 8, 11, and 12 as part of the Remedial Investigation (RI) for the Marine Corps Air Station (MCAS), El Toro, California (BNI 1997). Based on the HHRA results, selected units within Sites 8, 11, and 12 were recommended for further action (FA). A *Draft Record of Decision* (ROD) based on the conclusions and recommendations of the RI/Feasibility Study for the three sites was submitted to the Base Realignment and Closure (BRAC) Cleanup Team (BCT) (BNI 1999b). Subsequently, a separate *Draft Final ROD* was issued for Site 11 (BNI 1999a). The ROD for Sites 8 and 12 was suspended from being finalized until the completion of the radiological survey at both sites.

A detailed review of the HHRA performed in the RI showed that several exposure factors and toxicity indices used to derive the risk estimates are not current based on a comparison with those used by Region IX of the U.S. Environmental Protection Agency (EPA) in the development of its Preliminary Remediation Goal (PRG) table (EPA 2000). It was also determined that additional data collected subsequent to the RI should be incorporated.

This risk reevaluation has been conducted in accordance with a letter that was submitted to the BCT by the Navy in December 2000. The approach was presented for Site 11 in an attachment to the letter, titled *Memorandum, Proposed Reevaluation of Risk, Site 11, , Marine Corps Air Station, El Toro, California* (Earth Tech 2000), and discussed with the BCT members. The Navy also proposed to adopt a similar approach for Sites 8 and 12, if the presented approach was acceptable to the BCT. During a teleconference call in December 2000, BCT members concurred with the approach for reevaluating risks at Sites 8, 11, and 12.

This technical memorandum presents the results of the risk reevaluation by updating the previous HHRA and utilizing all available data and the California Environmental Protection Agency (Cal-EPA) and EPA Region IX toxicity information and exposure parameters for the year 2000. This risk reevaluation complies with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) in Title 40 of the Code of Federal Regulations (CFR), Part 300, and California Health and Safety Code, Section 6.8.

This technical memorandum was prepared by Earth Tech, Inc. (Earth Tech) on behalf of the U. S. Department of the Navy, Southwest Division, Naval Facilities Engineering Command, as authorized by the U.S. Navy, Pacific Division, Naval Facilities Engineering Command (PACNAVFACENGCOM) under contract task order (CTO) no. 0068 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) II program, contract no. N62742-94-D-0048.

1.1 MCAS EL TORO LOCATION

MCAS El Toro lies in a semi-urban agricultural area in southern California, approximately 8 miles southeast of the city of Santa Ana and 12 miles northeast of the city of Laguna Beach (Figure 1-1). MCAS El Toro covers approximately 4,738 acres.

Land use around the MCAS includes commercial, light industrial, and residential. MCAS El Toro closed on 2 July 1999, in accordance with the Base Realignment and Closure Act (1993) (BRAC III).

1.2 SITE DESCRIPTION AND BACKGROUND

Information from the *Phase II RI Report* (BNI 1997) and the *Draft ROD for Operable Unit (OU) 3A* (BNI 1999b) were used to provide a description of the site and to summarize the findings of the RI. The RI results were used to estimate cancer risks and noncancer hazard, and to provide recommendations for FA or no further action (NFA). These recommendations, along with the background information, are documented in detail in the *Draft ROD* for Sites 8, 11, and 12 (BNI 1999b) and *Draft Final ROD* for Site 11 (BNI 1999a).

The previous HHRA was based on exposure to soils at the sites; exposure to groundwater was not included because the RI indicated that site-specific contamination is present only in the shallow soil interval.

For Sites 8, 11, and 12 (Figure 1-2), the previous HHRA was performed using residential and industrial scenarios, in accordance with the methodology that was approved by the BCT (BNI 1997). The industrial worker exposure scenario was considered to be limited to contaminants in surface soil (0 to 2 feet below ground surface [bgs]). Exposure of a resident was considered to be limited to contaminants in the shallow soils (from 0 to 10 feet bgs). Exposure pathways that were found to be complete for chemicals in surface and shallow soils were ingestion of soil, inhalation of vapors and dust, and direct contact with the skin.

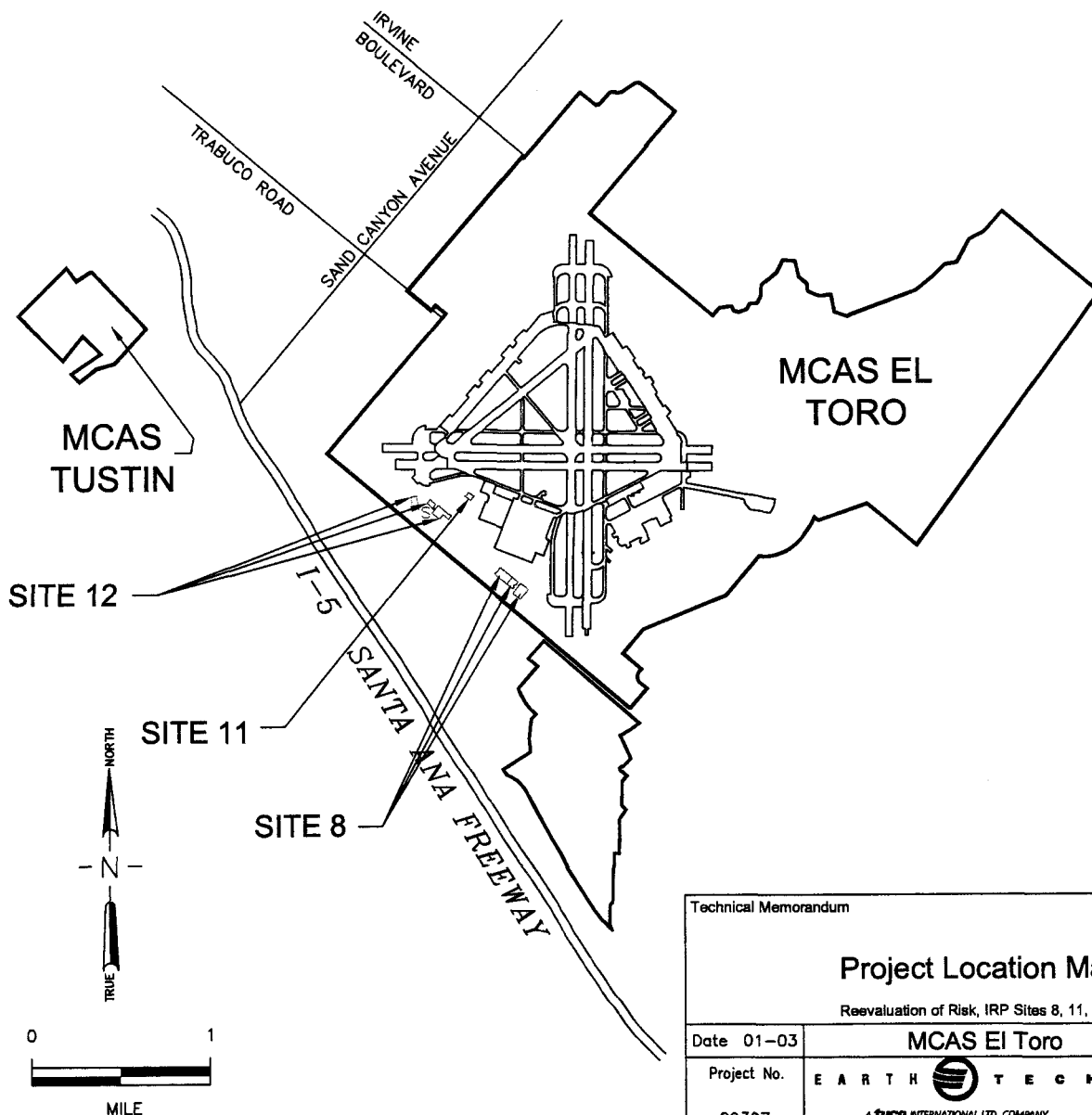
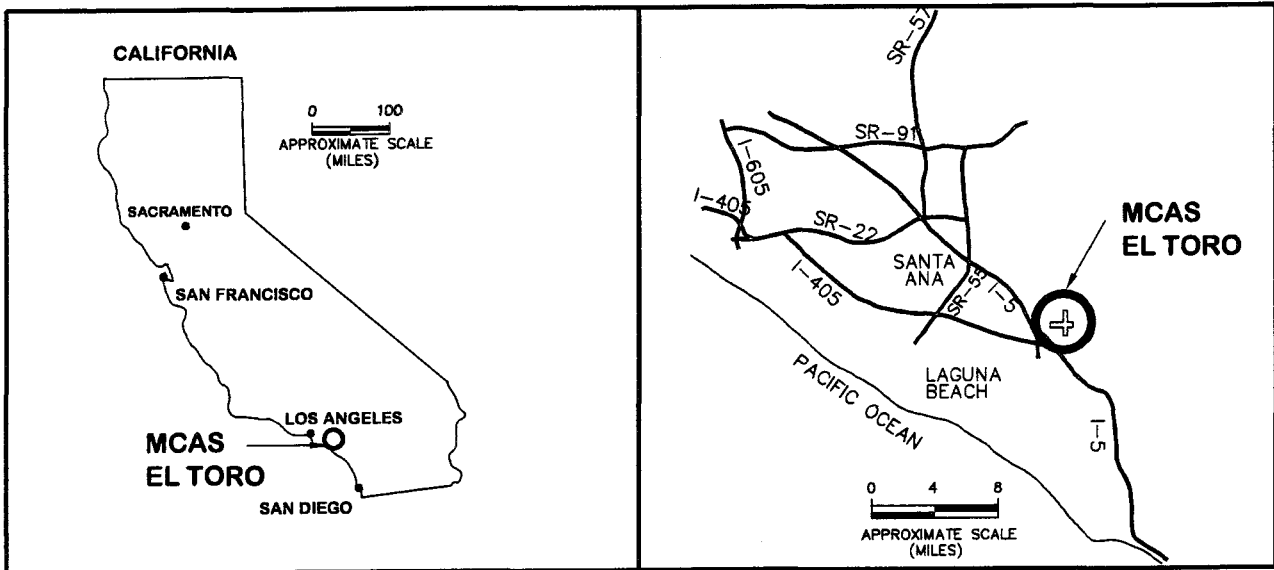
Excess lifetime cancer risks are probabilities that are generally expressed in scientific notation (i.e., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in a million chance of developing cancer as a result of site-related exposure to a carcinogen during a 70-year lifetime under the specific exposure conditions at a site. Guidelines for managing cancer risks are promulgated in the NCP (40 Code of Federal Regulations [CFR] 300.430 [2][2][I][A][2]). According to these regulations, excess cancer risks between 10^{-4} and 10^{-6} or less are considered generally allowable. Excess cancer risks below 10^{-6} are considered unconditionally allowable.

Potential noncarcinogenic effects of a single contaminant in a single medium are expressed as hazard quotients (HQs). The hazard index (HI) is generated by adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposure within a single medium or across media. EPA has also established guidelines for noncancer risks. Using these guidelines, an HI of less than 1 is generally considered protective of human health. If the HI is greater than 1, the chemicals are assessed to determine whether the HI represents an unacceptable noncarcinogenic human-health risk.

It was noted in the previous HHRA (BNI 1999b) that the evaluation of the residential scenario at Sites 8, 11, and 12 was considered conservative because the primary proposed reuses of these sites are industrial and aviation-related.

1.2.1 Site 8

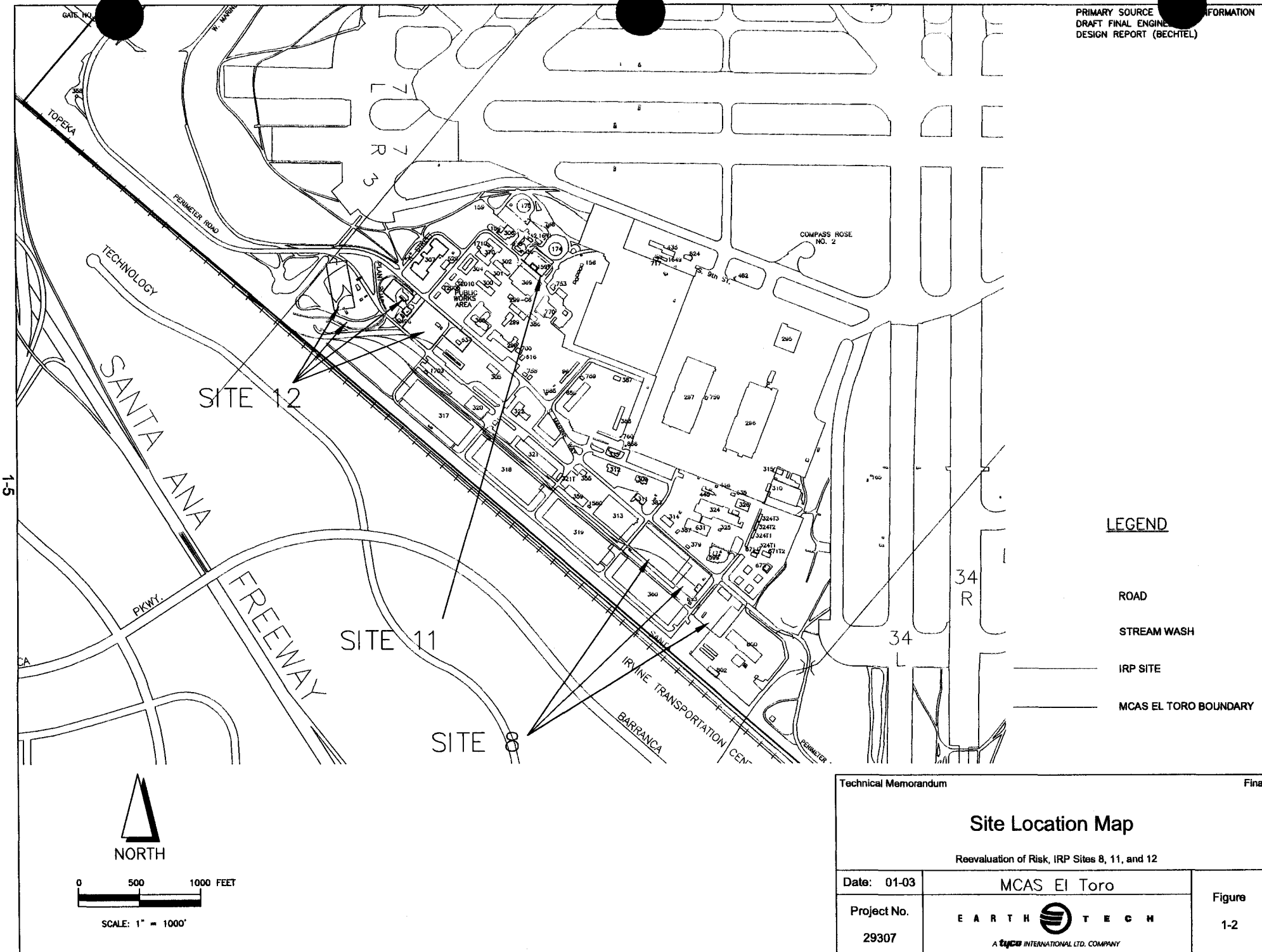
Site 8 was formerly a Defense Reutilization and Marketing Office (DRMO) storage area and is located in the southwest quadrant of the Station, as shown on Figure 1-1. The site is bounded by South Marine Way to the north, Building 360 to the south, Q Street to the west, and Building 800 to the east (See Figure 1-3, Site 8 Topographic Map, OU-3A ROD included in Appendix A). Site 8 was used as a storage area for containerized liquids and scrap and salvage materials from MCAS El



Technical Memorandum		Final
Project Location Map		
Reevaluation of Risk, IRP Sites 8, 11, and 12		
Date 01-03	MCAS El Toro	
Project No.	EARTH  TECH	
29307	A tyco INTERNATIONAL LTD. COMPANY	
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Toro and MCAS Tustin. The scrap materials include mechanical and electrical components and various types of liquids. Typical DRMO materials include surplus or used equipment. Site 8 consists of two distinct but adjacent areas bisected by R Street: an old salvage yard and a main storage yard. These two areas were subdivided into five separate units: Unit 1, East Storage Yard; Unit 2, West Storage Yard; Unit 3, Refuse Pile Area (the location of a former refuse pile within the West Storage Yard); Unit 4, Polychlorinated Biphenyl (PCB) Spill Area (located within the east storage yard); and Unit 5, Old Salvage Yard (BNI 1999b).

The refuse pile (Unit 3) was removed and disposed of prior to the initiation of the Phase I RI in 1991 (BNI 1999b). The Phase I RI indicated PCB contamination. The top 2 feet of the soil formerly beneath the refuse pile (approximately 229 cubic yards) was excavated and removed from Site 8 by a paving contractor. The overexcavated and stockpiled soil was characterized by the Navy Public Works Center in San Diego. The soil sample analytical results indicated that the concentrations of metals and PCBs in the stockpile were below levels deemed hazardous by EPA and Cal-EPA.

1.2.1.1 SUMMARY OF PREVIOUS HHRA

Unit 4 is completely contained within Unit 1, and Unit 3 is completely contained within Unit 2. Therefore, for risk assessment purposes, Unit 4 was grouped with Unit 1, and Unit 3 was grouped with Unit 2. Unit 5 was considered separately.

Units 1 and 4. No further action (NFA) was recommended for the combined group of Units 1 and 4; the excess lifetime cancer risk was estimated to be 2.0×10^{-5} and 1.5×10^{-5} for the residential and industrial scenarios, respectively, using EPA Region IX factors and if established, Cal-EPA modified factors (BNI 1999b). The primary contributors to the risk (also known as drivers) for both scenarios were the PCB Aroclor 1248 and benzo(a)pyrene; in addition, Aroclor 1260 also contributed to the industrial scenario risk. Both risks are within the generally acceptable range of 10^{-4} to 10^{-6} .

Units 2 and 3. The combined risk for this unit group was estimated to be 4.1×10^{-5} and 4.5×10^{-6} for the residential and industrial scenarios, respectively, using either EPA Region IX or Cal-EPA modified factors (BNI 1999b). The primary risk drivers were PCBs (68 percent) and arsenic (27 percent) for the residential scenario and arsenic (82 percent) for the industrial scenario. Both risks are within the generally acceptable NCP range of 10^{-4} to 10^{-6} .

The HI was estimated to be less than 1 for the industrial scenario and 2.3 for the residential scenario. The *Draft ROD* (BNI 1999b) indicated that both arsenic and manganese appear to be related to natural conditions, because no site-related activities involved the use of these metals. It was also calculated that if the PCBs were removed from the noncancer risk calculations, the HI for the residential scenario would fall below 1. Because PCBs were not present in any of the Unit 2 samples, it was concluded that the HI of 2.3 was applicable only to Unit 3.

During the Phase I RI, a total of 11 shallow samples were analyzed for PCBs from Unit 2 (seven samples) and Unit 3 (four samples). One sample from Unit 3, collected at a depth of 4 feet bgs, was reported with Aroclor 1248, Aroclor 1254, and Aroclor 1260 at concentrations of 0.244, 0.397, and 0.214 milligrams per kilogram (mg/kg), respectively (BNI 1997).

The Phase II RI had a total of 38 shallow samples analyzed for PCBs from Unit 2 (21 samples) and Unit 3 (17 samples). All analytes were reported below detection limits in the 38 samples from Units 2 and 3.

Further action was recommended for Unit 3 to remove the remaining PCB-contaminated shallow soil in a 35-foot by 70-foot area encompassing the northern/western half of Unit 3. Based on this area of

2,450 square feet and a depth up to 4 feet bgs, it was concluded that a remedial action is necessary to remove approximately 365 cubic yards (BNI 1999b).

Unit 5. The risk for this unit was estimated to be 1×10^{-4} and 6.8×10^{-5} for the residential and industrial scenarios, respectively, when using either EPA Region IX or Cal-EPA modified factors. The risk for the industrial scenario is within the generally acceptable range of 10^{-4} to 10^{-6} . For the residential scenario, the risk drivers were the polycyclic aromatic hydrocarbons (PAHs) indeno(1,2,3-c,d)pyrene (92 percent) and benzo(b)fluoranthene (7 percent), and the PCB Aroclor 1260 (2 percent).

The HI for the residential scenario was 1.1, with manganese contributing 55 percent. Site activities did not involve the use of manganese and it appears to be related to natural concentrations. The HI for the industrial scenario was 0.01.

Six shallow soil samples (collected from 0-10 feet bgs) were analyzed for semivolatile organic compounds (SVOCs) during the Phase I RI (BNI 1997). Indeno(1,2,3-c,d)pyrene and benzo(b)fluoranthene were not above reporting limits.

During the Phase II RI, six soil samples were analyzed for PAHs by EPA Method 8310. Benzo(b)fluoranthene, benzo(g,h,i)perylene, fluoranthene, and indeno(1,2,3-c,d)pyrene were reported above detection limits. However, fluoranthene was the only chemical that was reported with concentrations with no associated data validation qualifiers. Indeno(1,2,3-c,d)pyrene and benzo(g,h,i)perylene were detected in three of the samples and reported with the following concentrations respectively: 0.54, 6.1, and 31 mg/kg; and, 0.089, 1.2, and 6.1 mg/kg. All of these concentrations were flagged with a 'NJ' qualifier, which was explained in the footnotes to the table as follows:

NJ – Estimated value, compound was identified on the basis of presumptive evidence through a search of the mass spectral library

The RI Report states in the subsection *Discussion and Uncertainty Analyses* the following:

"The qualifiers associated with several of the risk drivers, namely benzo(a)pyrene and indeno(1,2,3-c,d)pyrene, reported concentrations indicate uncertainty in those values. The majority of detects for the organic analytes are qualified as "J" by the data validators. Concentrations indicated by the "J" qualifier are estimated quantities or below the detection limit. Therefore, the risk results presented for Site 8 should not be taken as a characterization of absolute risk. Conclusions by risk managers about the significance of the risk need to integrate the uncertainties affecting the risk estimates."

Further action was recommended for Unit 5 to remove the PAH-contaminated soil in a 380-foot by 220-foot area encompassing the western half of the unit. Based on this area of approximately 83,600 square feet and a depth of 6 feet, it was concluded that remedial action is necessary to remove approximately 18,580 cubic yards (BNI 1999b).

1.2.2 Site 11

Site 11 was formerly a Transformer Storage Area and located in the southwest quadrant of the Station, as shown on Figure 1-1. The site is located on the northeast side of Building 369 (See Figure 1-4, Site 11 Topographic Map, OU-3A ROD included in Appendix A). The site is fenced and consists of three units: Unit 1, a concrete pad (approximately 30 by 30 feet) and a 3-foot wide strip of ground adjacent to it; Unit 2, an asphalt-lined drainage ditch parallel to the northeast side of Building 369 and extending from the loading dock at the southern boundary to N Street at the

northern boundary; and Unit 3, the remainder of the fenced, unpaved storage yard behind Building 369.

Site 11 was used as a maintenance and storage yard for transformers. Most of the storage yard is relatively flat and covered with gravel, concrete, or asphalt pavement. A wide, shallow depression is located in the center of the yard. Staining was evident in the depression during the Phase I RI (BNI 1999b).

1.2.2.1 SUMMARY OF PREVIOUS HHRA

For risk assessment purposes, Units 1, 2, and 3 were considered separately.

Unit 1. The risk for this unit was estimated to be 9.1×10^{-5} and 6.0×10^{-5} for the residential and industrial scenarios, respectively (using either EPA or Cal-EPA modified factors). Aroclor 1260 contributes 99 percent of the risk for each of the two scenarios. The risk for the residential and industrial scenarios is within the generally acceptable NCP range of 10^{-4} to 10^{-6} .

The HI for Unit 1 is 4.5 and 1.1 for the residential and industrial scenarios respectively, with Aroclor 1260 accounting for 99 percent of the noncancer hazard

Further Action was recommended for Unit 1 to remove the PCB-contaminated soil in the 30-foot by 30-foot concrete pad (36-foot by 36-foot area was estimated for removal purposes in the *Draft Final ROD*) and the 3-foot wide strip of ground adjacent to it (a 100-foot perimeter length by a 5-foot width was estimated for removal purposes in the *Draft Final ROD*), for a total area of approximately 1,795 square feet. Based on this area and a depth of 2 feet, it was concluded that remedial action is necessary to remove approximately 133 cubic yards (BNI 1999a).

Unit 2. The cancer risks for residential and industrial scenarios at this unit were estimated to be 5.9×10^{-6} and 4.5×10^{-6} , respectively, with Aroclor 1260 contributing 99 percent. These risks are within the generally acceptable NCP range of 10^{-4} to 10^{-6} .

The HI for Unit 2 is 0.30 and 0.83 for the residential and industrial scenarios, respectively, which are below 1.

Further action was recommended for Unit 2 to remove the PCB-contaminated soil in the drainage ditch. For remedial purposes, a 195-foot length of the ditch (5 feet wide and 2 feet deep) and a 25-foot length of the ditch (in the southwest portion of the unit, 4 feet wide and 6 feet deep) were estimated. Based on these areas and depths, it was concluded that a remedial action is necessary to remove approximately 100 cubic yards (BNI 1999b).

Unit 3. The risk for this unit was estimated for the residential and industrial scenarios to be 3.0×10^{-7} and 1.6×10^{-8} , respectively. The HI for the residential and industrial scenarios was estimated to be 0.017 and 0.00031, respectively.

NFA was recommended for this unit, since the cancer risk is less than 1×10^{-6} , and the HI is lower than 1.

1.2.3 Site 12

Site 12, designated as the Sludge Drying Beds, is located in the southwest quadrant of MCAS El Toro as shown on Figure 1-2. Site 12 is located near Plant Road, South Marine Way, and immediately adjacent to an exposed portion of Bee Canyon Wash (See Figure 1-5, Site 12 Topographic Map, OU-3A ROD included in Appendix A). Site 12 includes the former locations of the Wastewater Treatment Plant (WWTP) and the Industrial Wastewater Treatment Plant (IWWTP).

The sludge generated from the WWTP was de-watered at Site 12 and subsequently abandoned in the sludge-drying beds and plowed under.

Site 12 consists of four units: Unit 1, the former location of the west sludge-drying beds; Unit 2, the former location of the east sludge-drying beds; Unit 3, a drainage ditch; and Unit 4, the location of the former wastewater treatment plants. The east and west sludge-drying beds consisted of multicelled, sand-infiltration beds surrounded by a 4-foot-high earthen berm. The drainage ditch was an unimproved earthen channel that skirted both sludge-drying bed areas and terminated at Bee Canyon Wash. The WWTP area included eight concrete aboveground treatment tanks and a pump building. The IWWTP located immediately east of the WWTP included two aboveground tanks and a sludge sump.

The IWWTP treated waste liquids generated during metal plating operations that occurred primarily at Buildings 295, 296, 297, and 324. Industrial sewer lines are believed to have brought processed liquid to the IWWTP. Effluent lines ran from the IWWTP to the WWTP. The IWWTP reportedly operated for only a brief period in 1945–1946. By 1961, the IWWTP had been dismantled. Sludge lines also ran from the IWWTP and WWTP to the East and West Sludge-Drying Beds (Units 1 and 2) where sludges were dewatered (BNI 1999b).

1.2.3.1 SUMMARY OF PREVIOUS HHRA

For risk assessment purposes, Unit 2 was grouped with Unit 4. Unit 1 and Unit 3 were each considered separately.

Unit 1. The risk for this unit was estimated to be 7.6×10^{-5} and 4.2×10^{-5} for the residential and industrial scenarios respectively (using EPA Region IX and applicable Cal-EPA modified factors). The primary risk drivers were PAHs, arsenic, and the PCB Aroclor 1260 for both scenarios. These risks are within the generally acceptable NCP range of 10^{-4} to 10^{-6} .

The HI for Unit 1 was estimated to be 4.6 and 0.76 for the residential and industrial scenarios, respectively. The primary contributors to the residential HI were 2-(2-methyl-4-chlorophenoxy)-propionic acid (MCPP) at 52 percent, manganese at 14 percent, Aroclor 1254 at 10 percent, and 2-methyl-4-chlorophenoxy-acetic acid (MCPA) at 6 percent.

Site activities did not involve the use of manganese and it appears to be background concentrations.

The noncancer risk was calculated based on the following analytical summary for shallow samples: MCPP (12 samples analyzed, one detected at 94 mg/kg); Aroclor 1254 (21 samples analyzed, one detected at 0.283 mg/kg); and MCPA (9 samples analyzed, one detected at 5.5 mg/kg). For each of these chemicals, the exposure point concentration (EPC) used to calculate the cancer and noncancer risks were based on the maximum concentration, which was the one detected concentration.

Based on the conservative nature of the risk assessment calculations, it was concluded that a remedial action is not warranted at Unit 1.

Units 2 and 4. The risk for this unit group was estimated to be 2.8×10^{-5} and 2.3×10^{-5} for the residential and industrial scenarios, respectively (using Cal-EPA modified factors). The primary risk drivers were metals and PAHs for both scenarios; additionally, for the industrial scenario, Aroclor 1260 contributed 17 percent of the risk. These risks are within the generally acceptable NCP range of 10^{-4} to 10^{-6} .

The HI for this unit group is 2.1 and 0.53 for the residential and industrial scenarios respectively. The primary contributors to the residential HI were manganese at 34 percent, MCPA at 18 percent, and arsenic at 16 percent.

Site activities did not involve the use of manganese or arsenic, and these compounds are assumed to be natural background concentrations. A total of 48 shallow samples were analyzed for MCPA and two were reported above detection limits. The maximum concentration of 7.5 mg/kg was used as the EPC; this overestimates the risks, since two detections out of 48 samples does not representatively characterize site conditions.

No further action was recommended for Units 2 and 4 based on the above discussed factors (BNI 1999b).

Unit 3. The risk for this unit was estimated to be 5.1×10^{-5} and 9.3×10^{-5} for the residential and industrial scenarios, respectively (using Cal-EPA modified factors). These risks are within the generally acceptable NCP range of 10^{-4} to 10^{-6} .

The risk drivers for the residential scenario were arsenic (27 percent), dibenz(a,h)anthracene (13 percent), benzo(a)pyrene (22 percent), dieldrin (11 percent), dichlorodiphenyltrichloroethane (DDT) (8 percent), benzo(b)fluoranthene (6 percent), Aroclor 1260 (6 percent), benzo(k)fluoranthene (4 percent), and Aroclor 1254 (3 percent).

The risk drivers for the industrial scenario were Aroclor 1254 (58 percent), Aroclor 1260 (15 percent), arsenic (5 percent), benzo(a)pyrene (8 percent), dieldrin (3 percent), dibenz(a,h)anthracene (3 percent), DDT (3 percent), benzo(b)fluoranthene (2 percent), and benzo(k)fluoranthene (2 percent).

The HI for this unit is 5.9 and 2.3 for the residential and industrial scenarios, respectively. The primary contributors to the residential HI were MCPP at 66 percent, manganese at 12 percent, and aluminum at 5 percent. The industrial HI was comprised of Aroclor 1254 (49 percent), MCPP (36 percent), and Aroclor 1260 (11 percent).

Arsenic, manganese, and aluminum reported in Unit 3 are recognized to be related to natural background conditions. A total of 25 shallow soil samples were analyzed for MCPP, with one sample reported above detection limits at a concentration of 153 mg/kg. This concentration was used as the EPC and results in an overestimation of risks, since one out of 25 samples does not representatively characterize site conditions.

Further action was recommended for Unit 3 to remove the potentially contaminated soil that migrates off site (and off station, since Unit 3 discharges water into Bee Canyon Wash) during storm events. Based on an approximate area of 24,785 square feet and an average depth of 6.7 feet, the remedial action proposed to remove approximately 6,165 cubic yards.

1.3 ADDITIONAL SAMPLING OF FURTHER ACTION UNITS

The *Draft ROD* recommended FA for Units 3 and 5 at Site 8; Units 1 and 2 at Site 11; and Unit 3 at Site 12 (BNI 1999b). Additional sampling was conducted during May 1999 at the above units with the exception of Unit 3 at Site 8 and Unit 1 at Site 11 (OHM/TT 1999).

The analytical data results and sampling locations are included in Appendix B.

1.3.1 Site 8 – Unit 5

A total of 18 samples (shallow soil) were collected and analyzed for PCBs by EPA Method 8081 and PAHs by EPA Method 8310. These samples were collected at multiple depths (1.5 to 5.5 feet bgs) at eight locations using a hand auger.

All the analytes were reported at concentrations below the reporting limits, with the exception of phenanthrene, which was found in two locations (at depths of 1.5 and 2 feet bgs) at concentrations of 3 mg/kg and 2 mg/kg, respectively. Additionally, Aroclor 1260 was reported as an estimated value (0.008 mg/kg with J qualifier) in one of the hand-auger locations at a depth of 1.5 feet bgs.

1.3.2 Site 11 – Unit 2

Four soil samples were analyzed for PCBs and pesticides/herbicides by EPA Method 8081. These samples were collected at depths of 1.5 feet and 3.5 feet bgs at two locations.

4,4'-dichlorodiphenyldichloroethane (4,4'-DDD) was detected in one sample at a concentration of 0.043 mg/kg; 4,4'-DDE was reported as an estimated concentration of 0.016 mg/kg (J qualifier) in the same sample. All four samples were reported with 4,4'-DDT at concentrations of 0.033, 0.046, 0.075, and 1 mg/kg.

The PCB Aroclor 1260 was detected in all four samples at concentrations of 0.23, 0.44, 2.6, and 9 mg/kg.

Other chemicals detected were endosulfan sulfate (one sample at 0.027 mg/kg) and endrin aldehyde (0.031 mg/kg and an estimated concentration of 130 mg/kg).

1.3.3 Site 12 – Unit 3

Three soil samples were collected at depths of 1 foot bgs from three hand-auger locations at this unit. An additional sample was collected at one location at a depth of 1.5 feet bgs and was designated as a duplicate. All samples were analyzed for pesticides and herbicides by EPA Method 8081.

Chemicals that were detected in at least one sample include 4,4'-DDD (0.0046 to 0.110 mg/kg), 4,4'-DDE (0.0059 to 0.845 mg/kg), 4,4'-DDT (0.04 to 0.512 mg/kg), dieldrin (0.0005 to 0.03 mg/kg), endosulfan (not detected to 0.0022 mg/kg), endrin (0.0007 to 0.051 mg/kg), endrin aldehyde (0.001 to 0.03 mg/kg), and methoxychlor (0.002 to 0.045 mg/kg).

2. RATIONALE AND APPROACH

The objective of the reevaluation of risk was two-fold:

- Incorporate updated exposure factors and toxicity factors recommended for use by Cal-EPA and USEPA Region IX (EPA 2000) for all units at each of Sites 8, 11, and 12.
- Incorporate additional data that were collected during May 1999 (OHM 1999) for Site 8 – Unit 5; Site 11 – Unit 2; and Site 12 – Unit 3.

This risk reevaluation was performed in accordance with the RI risk assessment (BNI 1997). No changes were made to the methodology or approach. Previously established exposure scenarios and receptors that were reviewed and approved by the BCT were used without any changes.

To facilitate a comparable evaluation of the risk between this reevaluation and the previous HHRA (BNI 1997), the number of significant figures reported in this risk reevaluation was maintained consistent with that of the RI study.

For units without additional data (all NFA units and Site 8 – Unit 3 and Site 11 – Unit 1, which are FA units), the EPC was calculated and presented in the *Phase II RI Report* (BNI 1997). For units with additional data, new EPCs were calculated by adding the new analytical results to the RI data. Using these EPCs, the updated risk was calculated for residential (shallow soils) and industrial (surface soils) scenarios.

2.1 RECEPTOR IDENTIFICATION

Three receptor groups were evaluated consistent with the RI (BNI 1997):

- Child resident
- Adult resident
- Industrial worker

2.2 DATA ENTRY AND SELECTION OF RELEVANT DATA SETS

Some data were digitally scanned and imported into Excel spreadsheets. Remaining data were hand entered. Data not typically used to evaluate risk (i.e., total petroleum hydrocarbons and gasoline/diesel range organics) were excluded from the data sets. Chemicals not detected in either surface or subsurface soils were eliminated from the database.

Data for each unit were separated into two groupings dependent on the receptor group evaluated. Soil samples in the 0 to 10 foot depth interval were evaluated assuming adult and child residential receptors. Soil samples in the 0 to 2 foot interval were evaluated assuming industrial receptors.

2.3 EXPOSURE FACTORS AND TOXICITY INDICES

Where applicable, exposure factors were taken from the EPA Region IX PRG table for the year 2000 (EPA 2000). In all other instances, exposure factors were taken directly from the risk assessment appendix (Appendix K) of the RI Report (BNI 1997). Toxicity factors (cancer potency factors and noncancer reference doses) were taken from the EPA Region IX PRG table (EPA 2000).

The cancer risk reevaluation considered a hypothetical resident adult. The adult exposure in the RI risk assessment was assumed for a total of 30 years: 6 years as a child and 24 years as an adult.

The noncancer risk reevaluation calculated the HI for a child with an exposure duration of 6 years and the HI for an adult with an exposure duration of 24 years. The child HI was always higher due to higher intake rates and doses resulting from lower body weight and thus lower mass per surface area.

2.4 CALCULATION OF EXPOSURE POINT CONCENTRATIONS

As noted earlier, subsequent to the performance of the Phase II RI, additional data were collected for the three units that were recommended for further evaluation. These data (provided in Appendix B) were included in the risk reevaluation and exposure point concentrations (EPCs) were recalculated.

Proxy concentrations of one-half the reported detection limit (DL) were used for constituents reported at or below the DL. EPCs were calculated according to EPA protocol (EPA 1992). Using this method, the lesser of either the maximum detected value or the 95 percent upper confidence limit (UCL) was chosen as the applicable EPC. This approach was consistent with the RI risk assessment.

2.5 CALCULATION OF CANCER RISK AND NONCANCER HAZARD

Algorithms used in the *Phase II RI Report* (BNI 1997) to estimate risk were incorporated directly into this risk reevaluation. The specific equations used to determine cancer risk and noncancer hazard are provided on the chemical-specific risk summary tables contained in Appendix C.

The updated cumulative cancer risk and noncancer hazard indices were calculated for residential and industrial receptors associated with potential exposure to all chemicals of potential concern (COPC) that were identified in the RI risk assessment (BNI 1997). In addition, the contribution to risk or hazard by natural and anthropogenic background chemicals were deducted from the cumulative risk/HI to calculate the risk excluding background.

3. RESULTS AND DISCUSSION

Tables 3-1, 3-2, and 3-3 provide the summary of results of the risk reevaluation for the residential and industrial receptors for Sites 8, 11, and 12, respectively. The excess lifetime cancer and noncancer risk HI presented in the *Draft ROD* (BNI 1999b) and *Draft Final ROD* (1999a), along with the previous recommendations for FA or NFA are also included in these tables. The risk reevaluation worksheets are included in Appendix C.

3.1 SITE 8

3.1.1 Units 1 and 4

The *Draft ROD* recommended NFA for Units 1 and 4 (BNI 1999b). The recommendation was based on both residential and industrial scenario cancer and noncancer risks being acceptable if no remediation occurred. The cancer risks for both scenarios were within the generally acceptable NCP range of 10^{-4} to 10^{-6} . The HI for both scenarios was below 1.

The updated risks and HI obtained from this risk reevaluation were lower than the previously calculated values shown in Table 3-1. This reduction in risk was primarily due to the updated toxicity factors for Aroclor 1248 and Aroclor 1260.

3.1.2 Units 2 and 3

Though Units 2 and 3 were considered together as one group, the *Draft ROD* recommended FA for Unit 3 and NFA for Unit 2 (BNI 1999b). This was due to the HI for the residential scenario, which was 2.3, with the primary risk drivers being Aroclor 1254 and Aroclor 1248. Since these PCBs were only found in Unit 3 and not evidenced in Unit 2, the elevated HI was associated with Unit 3 and separate recommendations were made for the two units.

The updated HI for the residential scenario is 1.24, which is slightly above the acceptable level of 1. It should be noted that this noncancer risk includes contributions by arsenic (13 percent) and manganese (11 percent), which are attributed to background levels in the *Draft ROD* (BNI 1999b). If exposure to arsenic and manganese concentrations were eliminated by background comparison, then the HI would be less than 1.

3.1.3 Unit 5

Further action was recommended for Unit 5 because the cancer risk for residential scenario was 1×10^{-4} , 99 percent of which was contributed by PAHs (indeno(1,2,3-cd)pyrene and benzo(b)fluoranthene).

Revised risk estimates were determined after incorporating analytical data from 18 additional samples that were collected. All 18 samples were reported with non-detectable concentrations of both indeno(1,2,3-cd)pyrene and benzo(b)fluoranthene (detection limits for the samples were 2.1, 2.2, 2.3, 3, 11, and 12 micrograms per kilogram [$\mu\text{g}/\text{kg}$] for both analytes). However, the EPC for this unit did not change, since the maximum concentrations that were reported in the RI were still the applicable value. The updated risk is 4.3×10^{-5} ; the reduction in risk is primarily due to the updated exposure parameters.

Similarly, the recalculated HI for this unit for the residential scenario decreased from 1.1 to 0.61. For the industrial use, the HI increased from 0.01 to 0.02.

Evaluation of the Phase I and II RI data indicated that the indeno(1,2,3-cd)pyrene and benzo(b)fluoranthene concentrations were flagged with qualifiers indicating uncertainty in the analytical results. The additional sampling that was conducted encompassed the Phase I and II RI sampling areas (drawings showing the location of the Phase I and II RI sampling locations and the additional sampling

locations of May 1999 are included in Appendix D for comparison purposes). Because all samples were reported with non-detectable concentrations of both indeno(1,2,3-cd)pyrene and benzo(b)fluoranthene, these data suggest that these two chemicals are not COPCs. Accordingly, a revised risk excluding these two PAHs was estimated to be 3.0×10^{-7} for the residential scenario.

It should be noted that the RI risk assessment included arsenic as a COPC for the industrial scenario and excluded it for the residential scenario. Accordingly, the revised risk excluding PAHs was estimated to be 1.2×10^{-6} for the industrial scenario.

3.2 SITE 11

3.2.1 Unit 1

The revised cancer risk estimates for the residential and industrial scenarios were 9.8×10^{-6} and 2.8×10^{-6} , respectively, as compared to the 9.1×10^{-5} and 6.0×10^{-5} estimated in the RI risk assessment. This risk was almost entirely contributed by Aroclor 1260 (99 percent).

Further action was recommended in the *Draft Final ROD* based on a HI of 4.5 and 1.1 for the residential and industrial scenarios, respectively (BNI 1999a). The corresponding updated HI values are 2.49 and 0.2 respectively. The reduction in the HI was due to the updated toxicity indices and exposure parameters for Aroclor 1260.

3.2.2 Unit 2

The cancer risks presented in the *Draft Final ROD* were 5.9×10^{-6} and 4.5×10^{-5} for the residential and industrial scenarios, respectively (BNI 1999a). The corresponding updated risks were 4.6×10^{-6} and 1.9×10^{-7} .

The revised HI values changed from those presented in the *Draft Final ROD* (from 0.3 and 0.83 for the residential and industrial scenarios to 1.08 and 0.0083) (BNI 1999a).

The risk driver was Aroclor 1260 (greater than 90 percent); FA was recommended in the *Draft Final ROD* (BNI 1999a). The reevaluated risk calculation incorporates the additional data and the updated toxicity factors and exposure parameters. The additional data reflected an increase in the EPC for Aroclor 1260 from 0.179 to 1.2 mg/kg.

3.2.3 Unit 3

No further action was recommended in the *Draft Final ROD* based on acceptable risk and HI (BNI 1999a). The risk reevaluation resulted in a further reduction of the cancer and noncancer risk for the residential scenario. There was a marginal increase in the cancer and noncancer risk for the industrial scenario; however, all risks were lower than the generally acceptable NCP excess cancer risk of 1×10^{-6} and an HI less than 1.

3.3 SITE 12

3.3.1 Unit 1

The cancer risks presented in the *Draft Final ROD* were in the generally acceptable NCP range of 10^{-4} to 10^{-6} (BNI 1999b). The risk reevaluation resulted in the further reduction of these risks.

Table 3-1: Site 8 Risk Reevaluation Summary-Updated Versus Previous Risk Estimation

Unit Number	Risk Evaluation Reference	EXCESS LIFETIME CANCER RISK				NONCANCER RISK (Hazard Index)				Recommendations ^e
		Residential Scenario (0 to 10 feet bgs) Cal-EPA ^{a, b}	Residential Scenario Risk Drivers ^c	Industrial Scenario (0 to 2 feet bgs) Cal-EPA ^b	Industrial Scenario Risk Drivers ^c	Residential Scenario (0 to 10 feet bgs) ^{b, d}	Residential Scenario Risk Drivers ^c	Industrial Scenario (0 to 2 feet bgs) ^b	Industrial Scenario Risk Drivers ^c	
1, 4	<i>Record of Decision</i> (BNI 1999)	2.0×10^{-5}	Aroclor 1248 (49%) Benzo(a)pyrene (38%)	1.5×10^{-5}	Aroclor 1248 (43%) Benzo(a)pyrene (33%) Aroclor 1260 (14%)	0.79	—	0.21	—	<i>No further action recommended.</i>
	Reevaluation of Risk (Earth Tech 2001)	3.7×10^{-6}	Benzo(a)pyrene (52%) Aroclor 1248 (28%) Toxaphene (7%) Indeno(1,2,3-cd)pyrene (5%) Aroclor 1254 (2%) Aroclor 1260 (2%)	1.1×10^{-6}	Benzo(a)pyrene (50%) Aroclor 1248 (26%) Aroclor 1260 (9%) Indeno(1,2,3-cd)pyrene (5%) Toxaphene (5%) Aroclor 1254 (2%) Dieldrin (2%)	0.47	—	0.039	—	No further action recommended.
2, 3	<i>Record of Decision</i> (BNI 1999)	4.1×10^{-5}	Aroclor 1254 (32%) Arsenic (27%) Aroclor 1248 (19%) Aroclor 1260 (17%)	4.5×10^{-6}	Arsenic (82%)	2.3	Aroclor 1254 (28%) Manganese (22%) Aroclor 1248 (17%) Aroclor 1260 (15%) Arsenic (8%)	0.078	—	<i>No further action recommended for Unit 2. Further action recommended for Unit 3.</i>
	Reevaluation of Risk (Earth Tech 2001)	1.1×10^{-5}	Arsenic (65%) Aroclor 1254 (13%) Aroclor 1248 (8%) Aroclor 1260 (7%) Dibenz(a,h)anthracene (3%) Dieldrin (3%)	1.4×10^{-6}	Arsenic (89%) Dibenz(a,h)anthracene (8%) Indeno(1,2,3-cd)pyrene (3%)	1.24	Aroclor 1254 (28%) Aroclor 1248 (17%) Aroclor 1260 (15%) Arsenic (13%) Manganese (11%) Antimony (9%) Vanadium (5%)	0.02	—	No further action for Unit 2 Reevaluation of risk management decision for Unit 3 by BCT recommended
5	<i>Record of Decision</i> (BNI 1999)	1.0×10^{-4}	Indeno(1,2,3-cd)pyrene (92%) Benzo(b)fluoranthene (7%) Aroclor 1260 (2%)	6.8×10^{-5}	Indeno(1,2,3-c,d)pyrene (93%) Benzo(b)fluoranthene (6%)	1.1	Manganese (55%)	0.01	—	<i>Further action recommended.</i>
	Reevaluation of Risk (Earth Tech 2001)	4.3×10^{-5}	Indeno(1,2,3-cd)pyrene (93%) Benzo(b)fluoranthene (6%)	1.4×10^{-5}	Indeno(1,2,3-cd)pyrene (86%) Arsenic (8%) Benzo(b)fluoranthene (6%)	0.61	—	0.02	—	Based on the discussions with BCT a NFA status to be pursued for this unit.
	Reevaluation of Risk, excluding PAHs (Earth Tech 2001)	3.0×10^{-7}	Aroclor 1260 (53%) 4,4'-DDD (28%) Chromium (12%) 4,4'-DDE (7%)	1.2×10^{-6}	Arsenic (97%) 4,4'-DDD (1.5%)	0.58	—	0.02	—	

Notes:

- a cancer risk results shown are for the hypothetical residential adult; adult cancer risks are for a total of 30 years, 6 years as a child and 24 years as an adult
- b To facilitate a comparable evaluation of the risk between this reevaluation and the previous HHRA (BNI 1997), the number of significant figures reported in this risk reevaluation was maintained consistent with that of the RI study.
- c as determined by human-health risk assessment, number in parentheses is the compound's contribution to the total risk
- d systemic toxicity results shown are for the hypothetical resident child; child noncancer risks are higher than the adult noncancer risks
- e text in italics indicates recommendations based on the *Draft Record of Decision* (BNI 1999b); text in normal font indicates the recommendations based on the risk reevaluation results.
- indicates that there is no excess risk and therefore there are no risk drivers
- Italics indicate previous Remedial Investigation risk evaluation (BNI 1997)
- bgs - below ground surface
- Cal-EPA - California Environmental Protection Agency
- 4,4'-DDD - 4,4'-dichlorodiphenyldichloroethane
- 4,4'-DDE - 4,4'-dichlorodiphenyldichloroethylene
- PAHs - polycyclic aromatic hydrocarbons

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Table 3-2: Site 11 Risk Reevaluation Summary-Updated Versus Previous Risk Estimation

Unit Number	Risk Evaluation Reference	EXCESS LIFETIME CANCER RISK				NONCANCER RISK (Hazard Index)				Recommendations ^e
		Residential Scenario (0 to 10 feet bgs) Cal-EPA ^{a, b}	Residential Scenario Risk Drivers ^c	Industrial Scenario (0 to 2 feet bgs) Cal-EPA ^b	Industrial Scenario Risk Drivers ^c	Residential Scenario (0 to 10 feet bgs) ^{b, d}	Residential Scenario Risk Drivers ^c	Industrial Scenario (0 to 2 feet bgs) ^b	Industrial Scenario Risk Drivers ^c	
1	Record of Decision (BNI 1999)	9.1 x 10 ⁻⁵	Aroclor 1260 (99%)	6.0 x 10 ⁻⁵	Aroclor 1260 (99%)	4.5	Aroclor 1260 (99%)	1.1	Aroclor 1260 (99%)	<i>Further action recommended.</i>
	Reevaluation of Risk (Earth Tech 2001)	9.8 x 10 ⁻⁶	Aroclor 1260 (99%)	2.8 x 10 ⁻⁶	Aroclor 1260 (100%)	2.49	Aroclor 1260 (100%)	0.2		No change in selected response action specified in the Draft Final ROD (BNI 1999b); however cleanup to be evaluated based on updated slope factors and toxicity criteria (based on discussions with BCT)
2	Record of Decision (BNI 1999)	5.9 x 10 ⁻⁶	Aroclor 1260 (99%)	4.5 x 10 ⁻⁵	Aroclor 1260 (99%)	0.3	—	0.83	—	<i>Further action recommended.</i>
	Reevaluation of Risk (Earth Tech 2001)	4.6 x 10 ⁻⁶	Aroclor 1260 (91%) Dieldrin (7%) Heptachlor (1%)	1.9 x 10 ⁻⁷	Aroclor 1260 (57%) Dieldrin (36%) Heptachlor (5%) 4,4'-DDT (2%)	1.08	Aroclor 1260 (99%)	0.0083		No change in selected response action specified in the Draft Final ROD (BNI 1999b); however cleanup to be evaluated based on updated slope factors and toxicity criteria (based on discussions with BCT)
3	Record of Decision (BNI 1999)	3.0 x 10 ⁻⁷	—	1.6 x 10 ⁻⁸	—	0.017	—	0.00031	—	<i>No further action recommended.</i>
	Reevaluation of Risk (Earth Tech 2001)	1.2 x 10 ⁻⁷	—	2.4 x 10 ⁻⁸	—	0.01	—	0.0005	—	No further action recommended.

Notes:

a cancer risk results shown are for the hypothetical residential adult; adult cancer risks are for a total of 30 years, 6 years as a child and 24 years as an adult

b To facilitate a comparable evaluation of the risk between this reevaluation and the previous HHRA (BNI 1997), the number of significant figures reported in this risk reevaluation was maintained consistent with that of the RI study.

c as determined by human-health risk assessment, number in parentheses is the compound's contribution to the total risk

d systemic toxicity results shown are for the hypothetical resident child; child noncancer risks are higher than the adult noncancer risks

e text in italics indicates recommendations based on the *Draft Final Record of Decision* (BNI 1999a); text in normal font indicates the recommendations based on the risk reevaluation results.

— indicates that there is no excess risk and therefore there are no risk drivers

Italics indicate previous Remedial Investigation risk evaluation (BNI 1997)

bgs - below ground surface

Cal-EPA - California Environmental Protection Agency

4,4'-DDT - 4,4'-dichlorodiphenyltrichloroethane

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Table 3-3: Site 12 Risk Reevaluation Summary-Updated Versus Previous Risk Estimation

Unit Number	Risk Evaluation Reference	EXCESS LIFETIME CANCER RISK				NONCANCER RISK (Hazard Index)				Recommendations ^e
		Residential Scenario (0 to 10 feet bgs) Cal-EPA ^{a, b}	Residential Scenario Risk Drivers ^c	Industrial Scenario (0 to 2 feet bgs) Cal-EPA ^b	Industrial Scenario Risk Drivers ^c	Residential Scenario (0 to 10 feet bgs) ^{b, d}	Residential Scenario Risk Drivers ^c	Industrial Scenario (0 to 2 feet bgs) ^b	Industrial Scenario Risk Drivers ^c	
1	Record of Decision (BNI 1999)	7.6 x 10 ⁻⁵	Benzo(a)pyrene (45%) Arsenic (17%) Dibenz(a,h)anthracene (12%) Aroclor 1254 (12%) Benzo(k)fluoranthene (4%) Benzo(b)fluoranthene (3%) Benz(a)anthracene (3%) Indeno(1,2,3c,d)pyrene (2%)	4.2 x 10 ⁻⁵	Benzo(a)pyrene (52%) Aroclor 1254 (15%) Arsenic (13%) Benzo(k)fluoranthene (4%) Benzo(b)fluoranthene (4%) Benz(a)anthracene (3%)	4.6	MCPP (52%) Manganese (14%) Aroclor 1254 (10%) MCPA (6%)	0.76	—	No further action recommended.
	Reevaluation of Risk (Earth Tech 2001)	2.5 x 10 ⁻⁵	Benzo(a)pyrene (35%) Arsenic (33%) Dibenz(a,h)anthracene (16%) Benzo(a)anthracene (4%) Benzo(b)fluoranthene (4%) Aroclor 1254 (4%) Indeno(1,2,3-cd)pyrene (2%)	6.9 x 10 ⁻⁶	Benzo(a)pyrene (37%) Arsenic (29%) Dibenz(a,h)anthracene (17%) Benzo(b)fluoranthene (5%) Benz(a)anthracene (4%) Aroclor 1254 (4%) Indeno(1,2,3-cd)pyrene (2%)	2.6	MCPP (53%) Aroclor 1254 (10%) Aluminum (7%) Arsenic (7%) Manganese (7%) Silver (6%) MCPA (3%) Vanadium (3%)	0.14	—	No further action recommended.
2 and 4	Record of Decision (BNI 1999)	2.8 x 10 ⁻⁵	Arsenic (71%) Beryllium (13%) Dibenz(a,h)anthracene (5%) Benzo(a)pyrene (4%)	2.3 x 10 ⁻⁵	Arsenic (32%) Dibenz(a,h)anthracene (17%) Benzo(a)pyrene (12%) Aroclor 1260 (17%)	2.1	Manganese (34%) MCPA (18%) Arsenic (16%)	0.53	—	No further action recommended.
	Reevaluation of Risk (Earth Tech 2001)	1.4 x 10 ⁻⁵	Arsenic (89%) Dibenz(a,h)anthracene (4%) Benzo(a)pyrene (2%)	3.4 x 10 ⁻⁶	Arsenic (55%) Dibenz(a,h)anthracene (21%) Benzo(a)pyrene (9%) Benz(a)anthracene (3%) Benzo(b)fluoranthene (2%) Indeno(1,2,3-cd)pyrene (2%) Aroclor 1260 (2%)	1.08	Arsenic (26%) Aluminum (24%) Manganese (17%) MCPA (10%) Vanadium (9%) MCPP (4%) Barium (3%) Aroclor 1254 (2%) Aroclor 1260 (2%)	0.05	—	No further action recommended.
3	Record of Decision (BNI 1999)	5.1 x 10 ⁻⁵	Arsenic (27%) Dibenz(a,h)anthracene (13%) Benzo(a)pyrene (22%) Dieldrin (11%) 4,4'-DDT ⁱ (8%) Benzo(b)fluoranthene (6%) Aroclor 1260 (5%) Benzo(k)fluoranthene (4%) Aroclor 1254 (3%)	9.3 x 10 ⁻⁵	Aroclor 1254 (58%) Aroclor 1260 (15%) Arsenic (5%) Benzo(a)pyrene (8%) Dieldrin (3%) Dibenz(a,h)anthracene (3%) DDT (3%) Benzo(b)fluoranthene (2%) Benzo(k)fluoranthene (2%)	5.9	MCPP (66%) Manganese (12%) Aluminum (5%)	2.3	Aroclor 1254 (49%) MCPP (36%) Aroclor 1260 (11%)	Further action recommended.
	Reevaluation of Risk (Earth Tech 2001)	2.1 x 10 ⁻⁵	Arsenic (41%) Dibenz(a,h)anthracene (14%) Benzo(a)pyrene (13%) Dieldrin (11%) 4,4'-DDT (9%) Benzo(b)fluoranthene (6%) 4,4'-DDE (2%)	7.4 x 10 ⁻⁶	Aroclor 1254 (34%) Arsenic (22%) Benzo(a)pyrene (11%) Aroclor 1260 (9%) Dibenz(a,h)anthracene (7%) Dieldrin (7%) Benzo(b)fluoranthene (5%) 4,4'-DDT (3%)	3.32	MCPP (67%) Aluminum (8%) Arsenic (6%) Manganese (5%) 4,4'-DDT (3%) Vanadium (3%) Aroclor 1260 (2%)	0.39	—	Reevaluation of risk management considerations by BCT recommended

Notes:
a cancer risk results shown are for the hypothetical residential adult; adult cancer risks are for a total of 30 years, 6 years as a child and 24 years as an adult
b To facilitate a comparable evaluation of the risk between this reevaluation and the previous HHRA (BNI 1997), the number of significant figures reported in this risk reevaluation was maintained consistent with that of the RI study.
c as determined by human-health risk assessment, number in parentheses is the compound's contribution to the total risk
d systemic toxicity results shown are for the hypothetical resident child; child noncancer risks are higher than the adult noncancer risks
e text in italics indicates recommendations based on the Draft Record of Decision (BNI 1999b); text in normal font indicates the recommendations based on the risk reevaluation results.
_ indicates that there is no excess risk and therefore there are no risk drivers
Italics indicate previous Remedial Investigation risk evaluation (BNI 1997)
bgs - below ground surface
Cal-EPA - California Environmental Protection Agency
MCPP - 2-(2-methyl-4-chlorophenoxy)-propionic acid
MCPA - 2-methyl-4-chlorophenoxy-acetic acid
4,4'-DDT - 4,4'-dichlorodiphenyltrichloroethylene

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The reevaluation resulted in the reduction of the HI from 4.6 to 2.6 for the residential scenario and 0.76 to 0.14 for the industrial scenario.

The compounds MCPP (52 percent) and MCPA (6 percent) were the primary contributors to the HI of 4.6 that was presented in the Draft ROD (BNI 1999b). No further action was recommended since the EPC for MCPP was the single detected concentration out of a total of 12 shallow soil samples.

3.3.2 Units 2 and 4

The cancer risks presented in the *Draft ROD* were in the generally allowable range of 10^{-4} to 10^{-6} (BNI 1999b). The risk reevaluation resulted in the further reduction of these risks.

The reevaluation resulted in the reduction of the HI from 2.1 to 1.08 for the residential scenario and 0.53 to 0.05 for the industrial scenario.

Manganese, MCPA, and arsenic were the primary contributors to the HI of 2.1. Due to the updated toxicity indices and exposure parameters, the HI was reduced. The update also resulted in the increase in the percent contribution of arsenic.

3.3.3 Unit 3

The revised cancer risks for the residential and industrial scenarios were 2.1×10^{-5} and 7.4×10^{-6} , respectively, as compared to 5.1×10^{-5} and 9.3×10^{-5} during the RI risk assessment. This risk was contributed by arsenic, pesticides/herbicides, PAHs, and PCBs.

The revised HI is 3.32 and 0.39 for the residential and industrial scenarios, respectively, as compared to 5.9 and 2.3. The reduction in the HI was due to the updated exposure parameters for the risk drivers (MCPP, aluminum, arsenic, manganese, 4,4'-DDT, vanadium, and Aroclor 1260). It should be noted that MCPP, which contributes to 67 percent of the HI, was detected in only one of 25 samples. Deducting the MCPP contribution, the HI for the residential scenario would be approximately 1.1. Further, the HI for the industrial scenario is less than 1.

4. RISK MANAGEMENT CONSIDERATIONS AND RECOMMENDATIONS

This section presents the risk management considerations and recommendations for various units of Sites 8, 11, and 12 based on the results of risk reevaluation. The risk management considerations apply only to Unit 3 of Site 8 and Unit 3 of Site 12 where the Department of the Navy (DON) requests a reevaluation of the selected response action given the lower estimated risks as compared to Phase II RI risk assessment (BNI 1997). For these units no changes to the selected response action (as presented in Draft ROD [BNI 1999b]) are recommended in this report. The decision regarding changes to the response actions for these units will be made following discussions with the BCT members and documented in the final decision documents for Sites 8 and 12.

The response action recommendations are for the sites and units for which NFA has already been documented in Draft ROD (BNI 1999b) or Draft Final ROD (BNI 1999a). The recommendations are also provided for Units 1 and 2 of Site 11, and Unit 5 of Site 8 for which discussions regarding the response action have been completed with BCT.

4.1 PREVIOUS NO FURTHER ACTION-RECOMMENDED UNITS

The *Draft ROD* (BNI 1999b) and *Draft Final ROD* (BNI 1999a) recommended NFA for the following units:

Site 8 – Units 1 and 4; and Unit 2

Site 11 – Unit 3

Site 12 – Unit 1; and Units 2 and 4

The risk reevaluation, which was based on incorporating updated toxicity factors and exposure parameters resulted in a consistent reduction in the excess lifetime cancer risk and the noncancer risk (HI) for the above listed units (with the exception of Site 11–Unit 3, where there was an increase for the industrial scenario, but well within acceptable risks). Accordingly, this study concurs with the NFA recommendation for these units.

4.2 PREVIOUS FURTHER ACTION-RECOMMENDED UNITS

The *Draft ROD* (BNI 1999b) and *Draft Final ROD* (BNI 1999a) recommended FA for the following units:

- Site 8 – Units 3 and 5;
- Site 11 – Units 1 and 2; and
- Site 12 – Unit 3.

Risk management considerations based on the results of this risk reevaluation are discussed for each of these units separately.

4.2.1 Site 8 – Unit 3

The following are the risk management considerations for Unit 3 of Site 8:

1. The reevaluated cancer risk for Units 2 and 3 combined was estimated to be 1.1×10^{-5} and 1.4×10^{-6} , respectively, for the residential and industrial scenarios; these levels are within the generally acceptable NCP range of 10^{-4} to 10^{-6} . Arsenic is the predominant driver in both the industrial (89 percent) and residential (65 percent) scenarios. It should be noted that the stationwide background

concentration for arsenic at MCAS El Toro is 6.86 mg/kg (BNI 1996), and the EPCs for arsenic for residential and industrial receptors are 3.48 mg/kg and 3.4 mg/kg, respectively. This indicates that the risks to the residential and industrial receptors due to anthropogenic sources or station activities are overestimated, as the detected concentrations of arsenic are within the ambient range.

2. The reevaluated HI for Units 2 and 3 combined is 1.24 (residential) and 0.02 (industrial). Polychlorinated biphenyls, which were only evidenced at Unit 3, contribute 60 percent of the residential HI. Arsenic and manganese combined contribute 24 percent. The exposure point concentrations for arsenic for residential and industrial receptors are 3.48 mg/kg and 3.4 mg/kg, respectively, which are well within 6.86 mg/kg, the natural background concentration of arsenic for MCAS El Toro (BNI 1996). The exposure point concentrations for manganese for residential and industrial receptors are 229 mg/kg and 227 mg/kg, respectively, which are less than 291 mg/kg, the natural background concentration of manganese for MCAS El Toro (BNI 1996). This indicates that the noncancer risks to residential and industrial receptors due to anthropogenic sources or station activities are overestimated. If arsenic and manganese concentrations were not considered, the HI would drop to approximately 1.

The DON requests a reevaluation of the response action documented in the Draft ROD (BNI 1999b) based on the updated site risks and risk management considerations presented above.

4.2.2 Site 8 – Unit 5

The following risk management considerations were discussed with BCT for Unit 5 of Site 8:

1. The reevaluated cancer risk for Unit 5 was estimated to be 4.3×10^{-5} and 1.4×10^{-5} , respectively, for the residential and industrial scenarios. These levels are within the generally acceptable range of 10^{-4} to 10^{-6} , as defined by the NCP.
2. The principal drivers in the revised risk estimate were indeno(1,2,3-cd)pyrene (residential: 93 percent; industrial: 86 percent) and benzo(b)fluoranthene (industrial: 6 percent; residential: 6 percent). Examining the RI data revealed that the concentrations reported for these compounds were flagged with qualifiers indicating uncertainty in the confirmation/identification. Additional data that were collected did not confirm the presence of these compounds. Elimination of these two PAHs resulted in a cancer risk of 4.1×10^{-7} (residential) and 1.2×10^{-6} (industrial; 99 percent of this risk was caused by arsenic, which is attributed to natural background).
3. The reevaluated HI for this unit are 0.61 and 0.02 for the residential and industrial scenarios, respectively.

Based on the discussions, the BCT concurs with the risk reevaluation recommendation to eliminate the contribution of the two above-mentioned PAHs. As a result the cancer and noncancer risks at Unit 5 of Site 8 are below their respective benchmarks (10^{-6} for cancer risk and 1 for noncancer risk). Therefore, a no further action status will be pursued for this unit.

4.2.3 Site 11 – Units 1 and 2

For Site 11, discussions have been completed with the BCT regarding the response action. Following these discussions, DON concurs that further action is required for Units 1 and 2 of Site 11 and there will be no change to the response action selected in the Draft Final ROD (BNI 1999a) for Site 11 except that the evaluation of cleanup will be based on updated exposure factors and toxicity criteria.

4.2.4 Site 12 – Unit 3

The following are the risk management considerations for Unit 3 of Site 12:

1. The reevaluated cancer risk for this unit was estimated to be 2.1×10^{-5} and 7.4×10^{-6} , respectively, for the residential and industrial scenarios. These levels are within the generally acceptable range of 10^{-4} to 10^{-6} . Arsenic is a predominant risk driver for both residential (41 percent) and industrial (22 percent) scenarios. The exposure point concentrations for arsenic for residential and industrial scenarios are 4.1 mg/kg and 5.49 mg/kg, respectively, which are less than 6.86 mg/kg, the stationwide background concentration of arsenic at MCAS El Toro (BNI 1996). This indicates that the risk due to anthropogenic sources or station activities is overestimated as the exposure point concentrations for arsenic for both the residential and industrial receptors are within the ambient range. If the contribution of arsenic (which can be attributed to natural background [BNI 1999b]) is eliminated, the cancer risk reduces to 9.8×10^{-6} and 5.3×10^{-6} , respectively, for the residential and industrial scenarios.
2. The reevaluated HI for the residential and industrial scenarios are 3.32 and 0.39 respectively. The primary noncancer risk driver is MCPP (67 percent). Twenty-five shallow samples were analyzed for MCPP, and only one was reported above detection limits (which ranged from 25.4 mg/kg to 31.1 mg/kg, with one detection limit of 255 mg/kg) at a concentration of 153 mg/kg.

The DON requests a reevaluation of the response action documented in the Draft ROD (BNI 1999b) based on the updated site risks and risk management considerations presented above.

5. REFERENCES

Bechtel National, Inc (BNI) 1996. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations*. San Diego, California.

———. 1997. *Draft Final Phase II Remedial Investigation Report, OU-3A Sites, Marine Corps Air Station, El Toro, California*. March.

———. 1999a. *Draft Final Record of Decision, Operable Unit 3A, Site 11, Marine Corps Air Station, El Toro, California*. San Diego, California.

———. 1999b. *Draft Record of Decision, Operable Unit 3A, Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California*. San Diego, California.

Earth Tech, Inc. 2000. *Memorandum, Proposed Reevaluation of Risk, Site 11. , Marine Corps Air Station, El Toro, California*. Pearl Harbor, Hawaii. October.

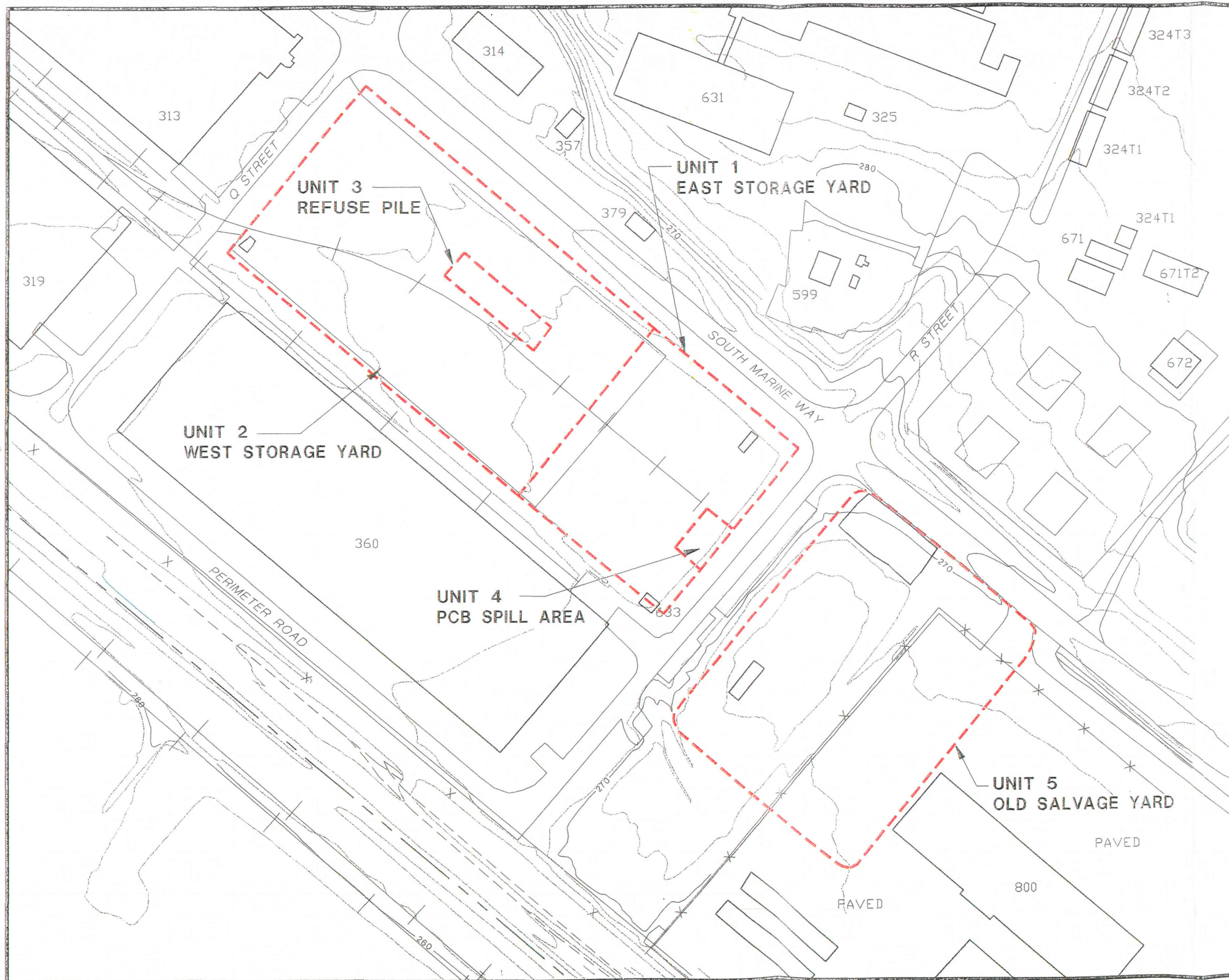
Environmental Protection Agency, United States (EPA). 1992. *Supplemental Guidance to RAGS: Calculating the Concentration Term*. Memorandum from Larry G. Reed, Director of Hazardous Waste Site Evaluation Division, Office of Emergency and Remedial Response. EPA/9285.7-081. 22 June.

———. 2000. *Region IX Preliminary Remediation Goal (PRG) Tables*. November. San Francisco.

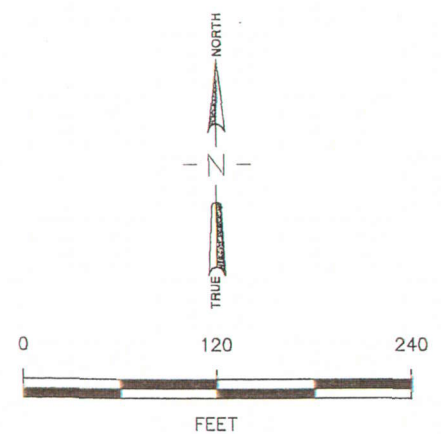
OHM/IT Group 1999. *Analytical and Location Survey Data Package, IRP Sites 8, 11, and 12*. Irvine, CA. May.

**Appendix A
Site Plans**

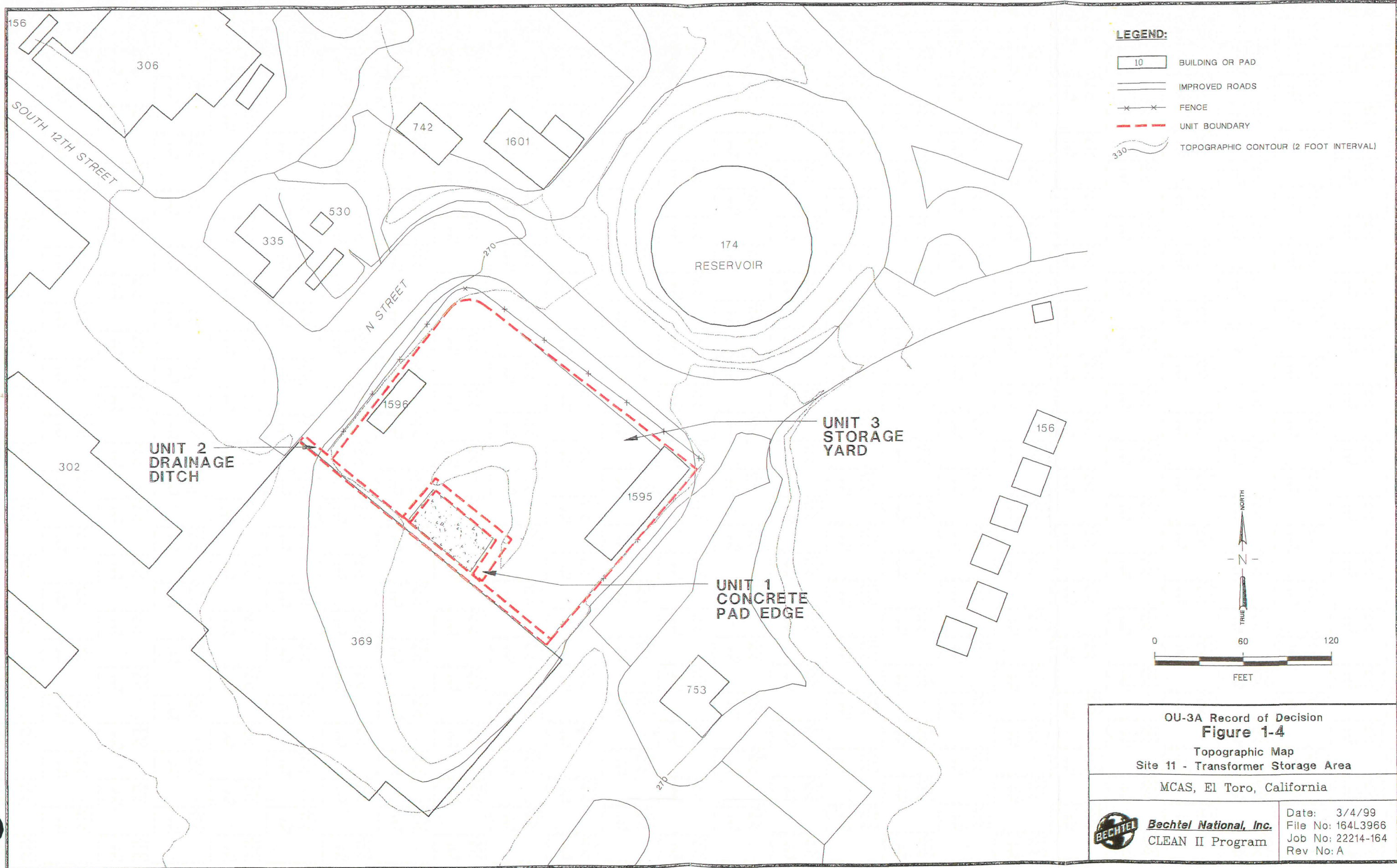
(Source : Draft Final Record of Decision, Bechtel National, Inc, June 1999)

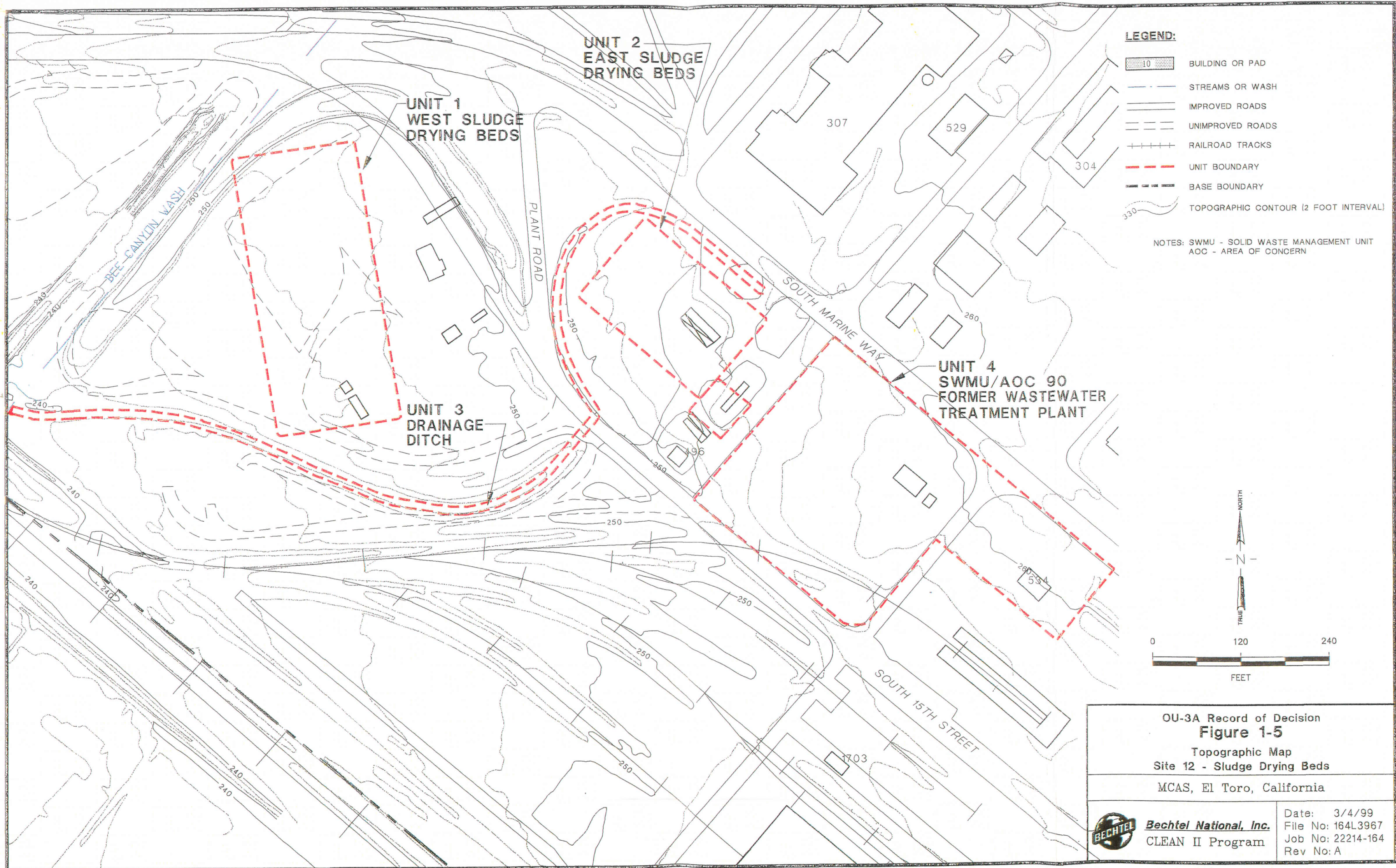


- LEGEND:**
- BUILDING OR PAD
 - IMPROVED ROADS
 - UNIMPROVED ROADS
 - RAILROAD TRACKS
 - FENCE
 - UNIT BOUNDARY
 - BASE BOUNDARY
 - TOPOGRAPHIC CONTOUR (2 FOOT INTERVAL)



OU-3A Record of Decision Figure 1-3 Topographic Map Site 8 - DRMO Storage Yard MCAS, El Toro, California	
Bechtel National, Inc. CLEAN II Program	Date: 3/4/99 File No: 164L3965 Job No: 22214-164 Rev No: A



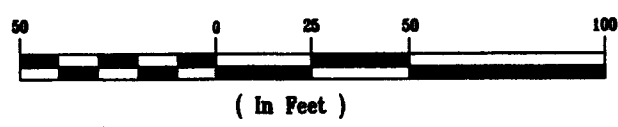


Appendix B
Additional Data for Site 8–Unit 5, Site 11–Unit 2, and Site 12–Unit 3
(Source: IT/OHM, May 1999)

MUCAS, EL TORO
IRP SITE 8/D0 65



Graphic Scale

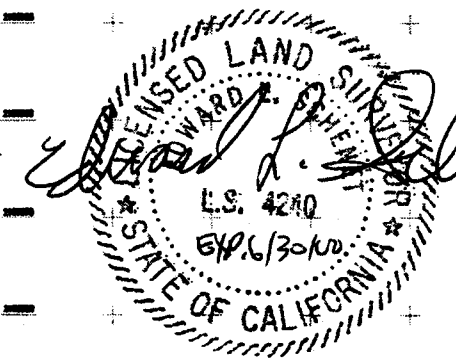
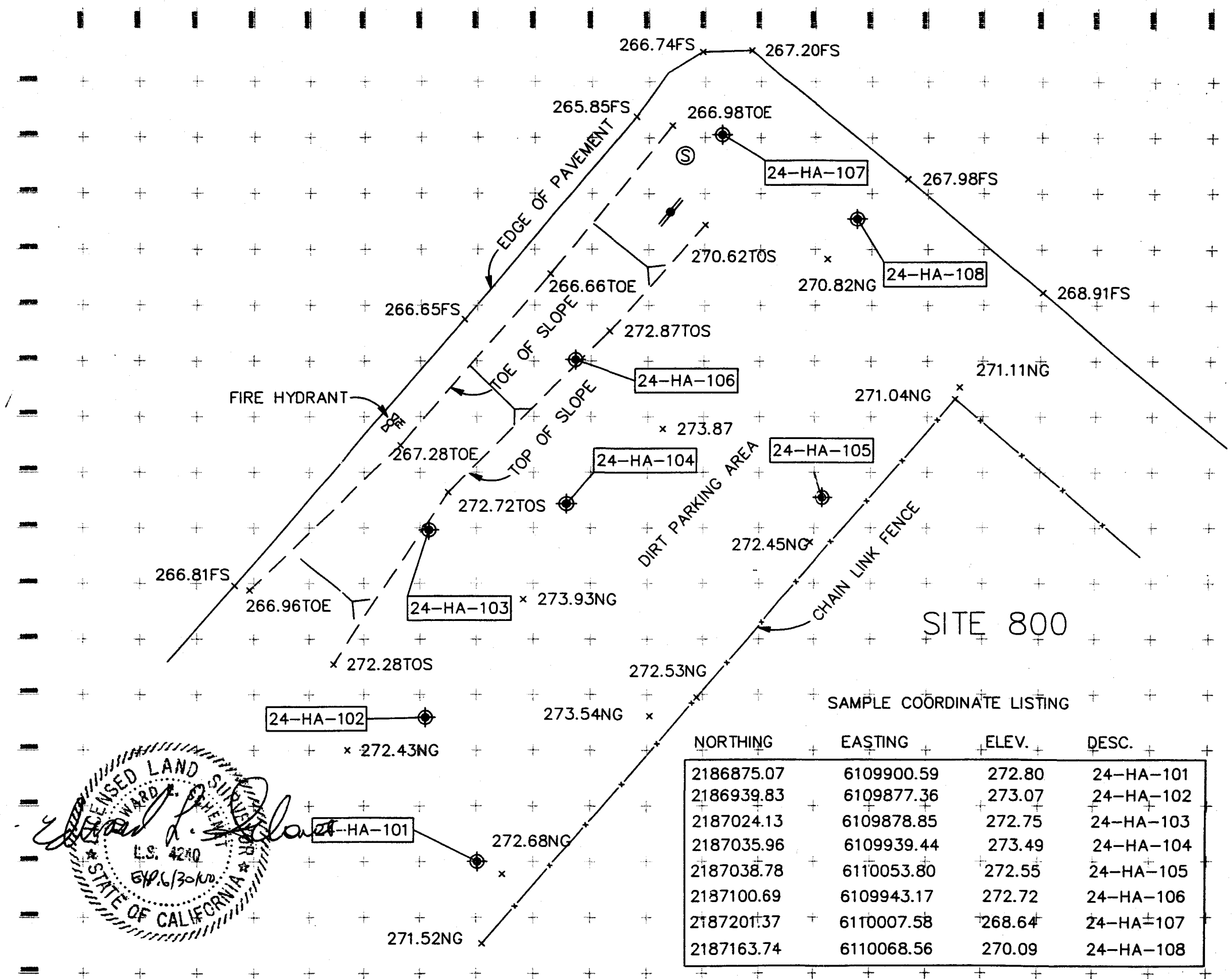


1 inch = 50 ft.

LEGEND

- SAMPLE POINTS
- NG NATURAL GROUND
- FS FINISH SURFACE
- Ⓢ SEWER MANHOLE
- POWER POLE

DATE OF SURVEY: 7-14-99



SAMPLE COORDINATE LISTING

NORTHING	EASTING	ELEV.	DESC.
2186875.07	6109900.59	272.80	24-HA-101
2186939.83	6109877.36	273.07	24-HA-102
2187024.13	6109878.85	272.75	24-HA-103
2187035.96	6109939.44	273.49	24-HA-104
2187038.78	6110053.80	272.55	24-HA-105
2187100.69	6109943.17	272.72	24-HA-106
2187201.37	6110007.58	268.64	24-HA-107
2187163.74	6110068.56	270.09	24-HA-108

Table
Analytical Results for Soil Samples — IRP 8

Sample Identification		18708-1086	18708-1087	18708-1088	18708-1089	18708-1090	18708-1091	18708-1092
Location Code		24-IRP8-HA101	24-IRP8-HA101	24-IRP8-HA102	24-IRP8-HA102	24-IRP8-HA103	24-IRP8-HA103	24-IRP8-HA104
Date Sampled		05/21/99	05/21/99	05/21/99	05/21/99	05/21/99	05/21/99	05/21/99
Depth (feet below ground surface)		1.5	5.0	1.5	5.0	1.5	5.0	2.0
	Unit							
EPA 8081								
Aroclor-1016	µg/kg	56 U	56 U	58 U	57 U	56 U	56 U	57 U
Aroclor-1221	µg/kg	110 U	110 U	120 U	110 U	110 U	110 U	110 U
Aroclor-1232	µg/kg	56 U	56 U	58 U	57 U	56 U	56 U	57 U
Aroclor-1242	µg/kg	56 U	56 U	58 U	57 U	56 U	56 U	57 U
Aroclor-1248	µg/kg	56 U	56 U	58 U	57 U	56 U	56 U	57 U
Aroclor-1254	µg/kg	28 U	28 U	29 U	29 U	28 U	28 U	28 U
Aroclor-1260	µg/kg	28 U	28 U	29 U	29 U	28 U	28 U	28 U
EPA 8310								
Acenaphthene	µg/kg	280 U	56 U	58 U	290 U	56 U	56 U	57 U
Acenaphthylene	µg/kg	110 U	23 U	23 U	110 U	23 U	22 U	23 U
Anthracene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Benzo[a]anthracene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Benzo[a]pyrene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Benzo[b]fluoranthene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Benzo[ghi]perylene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Benzo[k]fluoranthene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Chrysene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Dibenz[a,h]anthracene	µg/kg	28 U	5.6 U	5.8 U	29 U	5.6 U	5.6 U	5.7 U
Fluoranthene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Fluorene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Indeno[1,2,3-cd]pyrene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U
Naphthalene	µg/kg	280 U	56 U	58 U	290 U	56 U	56 U	57 U
Phenanthrene	µg/kg	11 U	2.3 U	2.3 U	11 U	3	2.2 U	2
Pyrene	µg/kg	11 U	2.3 U	2.3 U	11 U	2.3 U	2.2 U	2.3 U

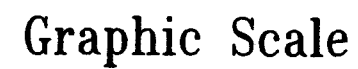
Table _____
Analytical Results for Soil Samples — IRP 8

Sample Identification		18708-1093	18708-1103	18708-1104	18708-1094	18708-1095	18708-1096	18708-1097
Location Code		24-IRP8-HA104	24-IRP8-HA105	24-IRP8-HA105	24-IRP8-HA106	24-IRP8-HA106	24-IRP8-HA106	24-IRP8-HA107
Date Sampled		05/21/99	05/24/99	05/24/99	05/21/99	05/21/99	05/21/99	05/21/99
Depth (feet below ground surface)		5.0	2.5	5.0	1.5	5.0	5.5	1.5
	Unit							
EPA 8081								
Aroclor-1016	µg/kg	57 U	57 U	74 U	58 U	55 U	55 U	54 U
Aroclor-1221	µg/kg	110 U	110 U	150 U	120 U	110 U	110 U	110 U
Aroclor-1232	µg/kg	57 U	57 U	74 U	58 U	55 U	55 U	54 U
Aroclor-1242	µg/kg	57 U	57 U	74 U	58 U	55 U	55 U	54 U
Aroclor-1248	µg/kg	57 U	57 U	74 U	58 U	55 U	55 U	54 U
Aroclor-1254	µg/kg	28 U	29 U	37 U	29 U	28 U	28 U	27 U
Aroclor-1260	µg/kg	28 U	29 U	37 U	29 U	28 U	28 U	8 J
EPA 8310								
Acenaphthene	µg/kg	57 U	57 U	74 U	290 U	55 U	55 U	54 U
Acenaphthylene	µg/kg	23 U	23 U	30 U	120 U	22 U	22 U	21 U
Anthracene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Benzo[a]anthracene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Benzo[a]pyrene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Benzo[b]fluoranthene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Benzo[ghi]perylene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Benzo[k]fluoranthene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Chrysene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Dibenz[a,h]anthracene	µg/kg	5.7 U	5.7 U	7.4 U	29 U	5.5 U	5.5 U	5.4 U
Fluoranthene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Fluorene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Indeno[1,2,3-cd]pyrene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Naphthalene	µg/kg	57 U	57 U	74 U	290 U	55 U	55 U	54 U
Phenanthrene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U
Pyrene	µg/kg	2.3 U	2.3 U	3.0 U	12 U	2.2 U	2.2 U	2.1 U

Table __
Analytical Results for Soil Samples — IRP 8

Sample Identification		18708-1098	18708-1099	18708-1100	18708-1101
Location Code		24-IRP8-HA107	24-IRP8-HA108	24-IRP8-HA108	24-IRP8-HA108
Date Sampled		05/21/99	05/21/99	05/21/99	05/21/99
Depth (feet below ground surface)		5.0	1.5	2.0	5.0
	Unit				
EPA 8081					
Aroclor-1016	µg/kg	58 U	53 U	54 U	58 U
Aroclor-1221	µg/kg	120 U	110 U	110 U	120 U
Aroclor-1232	µg/kg	58 U	53 U	54 U	58 U
Aroclor-1242	µg/kg	58 U	53 U	54 U	58 U
Aroclor-1248	µg/kg	58 U	53 U	54 U	58 U
Aroclor-1254	µg/kg	29 U	26 U	27 U	29 U
Aroclor-1260	µg/kg	29 U	26 U	27 U	29 U
EPA 8310					
Acenaphthene	µg/kg	58 U	53 U	54 U	58 U
Acenaphthylene	µg/kg	23 U	21 U	21 U	23 U
Anthracene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Benzo[a]anthracene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Benzo[a]pyrene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Benzo[b]fluoranthene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Benzo[ghi]perylene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Benzo[k]fluoranthene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Chrysene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Dibenz[a,h]anthracene	µg/kg	5.8 U	5.3 U	5.4 U	5.8 U
Fluoranthene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Fluorene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Indeno[1,2,3-cd]pyrene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Naphthalene	µg/kg	58 U	53 U	54 U	58 U
Phenanthrene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U
Pyrene	µg/kg	2.3 U	2.1 U	2.1 U	2.3 U

● SITE 11 D.O. 70







1 inch = 20 ft.

SAMPLE COORDINATE LISTING

NORTHING	EASTING	FS	DESCRIPTION
2189827.91	6108418.47	271.27	11SB01
2189824.22	6108422.91	271.29	11SB02

LEGEND

- | | |
|---|------------------|
|  | SAMPLE POINTS |
|  | VALVE |
| FS | FINISH SURFACE |
| TC | TOP OF CURB |
|  | FIRE HYDRANT |
|  | CHAIN LINK FENCE |

DATE OF SURVEY: 2-29-00

CAL VADA

SURVEYING, INC.

16 Business Center Dr, Corona, Ca 92880-1782
PHONE: (909) 280-9960 FAX: (909) 280-9746

JOB NO. SITE-11

PREPARED FOR:

IT CORPORATION

3347 MICHELSON DR., SUITE 200
IRVINE, CA 92612-1692

(949) 660-7594



Table 3-1
Preliminary Summary of Analytical Results — Site 11

Sample Identification		18708-1614	18708-1615	18708-1617	18708-1618
Location Code		11-SB-01	11-SB-01	11-SB-02	11-SB-02
Date Sampled		01/14/00	01/14/00	01/14/00	01/14/00
Depth (feet below ground surface)		1.5	3.5	1.5	3.5
EPA 8081	Unit				
4,4'-DDD	µg/kg	20 U	43	210 U	21 U
4,4'-DDE	µg/kg	20 U	16 J	210 U	21 U
4,4'-DDT	µg/kg	33	75	1000	46
Aldrin	µg/kg	100 U	100 U	1100 U	100 U
alpha-BHC	µg/kg	10 U	10 U	110 U	10 U
alpha-Chlordane	µg/kg	100 U	100 U	1100 U	100 U
Aroclor-1016	µg/kg	220 U	1100 U	1200 U	230 U
Aroclor-1221	µg/kg	220 U	1100 U	1200 U	230 U
Aroclor-1232	µg/kg	220 U	1100 U	1200 U	230 U
Aroclor-1242	µg/kg	450 U	2300 U	2300 U	450 U
Aroclor-1248	µg/kg	220 U	1100 U	1200 U	230 U
Aroclor-1254	µg/kg	220 U	1100 U	1200 U	230 U
Aroclor-1260	µg/kg	230	2600	9000	440
Beta-BHC	µg/kg	100 U	100 U	1100 U	100 U
Delta-BHC	µg/kg	100 U	100 U	1100 U	100 U
Dieldrin	µg/kg	20 U	15 J	210 U	21 U
Endosulfan I	µg/kg	20 U	21 U	210 U	21 U
Endosulfan II	µg/kg	20 U	21 U	210 U	21 U
Endosulfan sulfate	µg/kg	20 U	27	210 U	21 U
Endrin	µg/kg	20 U	21 U	210 U	21 U
Endrin aldehyde	µg/kg	20 U	31	130 J	21 U
gamma-BHC	µg/kg	100 U	100 U	1100 U	100 U
gamma-Chlordane	µg/kg	100 U	100 U	1100 U	100 U
Heptachlor	µg/kg	5.9 J	10 J	140 U	14 U
Heptachlor epoxide	µg/kg	14 U	14 U	140 U	14 U
Methoxychlor	µg/kg	100 U	26 J	1100 U	100 U

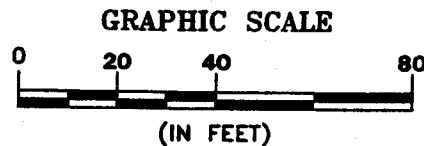
May 25, 2024 17:00:06 I:\OHM CORP\PROJECTS\2024\20242171.dwg

IRP She 12 DRAINAGE SWALE

Sample Location and Detected Analyte Summary

Boring Number	Location:			Sample Number	Depth (ft bgs)	EPA 8081 Pesticides										EPA 8150 Herbicides	
	Northing (NAD 83)	Easting (NAD 83)	Elevation (ft msl)			4,4'-DDD µg/kg	4,4'-DDE µg/kg	4,4'-DDT µg/kg	Dieldrin µg/kg	Endosulfan I µg/kg	Endrin µg/kg	Endrin aldehyde µg/kg	Heptachlor µg/kg	Methoxychlor µg/kg		2,4-D µg/kg	
HA01	2189738.89	6107304.73	249.83	20242-897	1.0	19 J	9.9 J	139 J	1 J	1.1 UJ B	0.7 J	2 J	1.1 UJ	2 J		11 UJ	
HA02	2189753.04	6107343.92	250.04	20242-898	1.0	4.6	5.9	40	0.5 J	1.1 U B	2.3 U B	1 J	1.1 U	2 J		11 U	
HA03	2189715.16	6107394.03	254.07	20242-899	1.0	35	360 B	140	20 B	10 B	10 B	6 J B	5.4 U	13 J		11 U	
HA03	2189715.16	6107394.03	254.07	20242-900 (Dup)	1.5	110 B	845 B	512 B	30 B Y	22 B	51 B	30 B	11 U	45 J		11 U	
PB01	2189552.72	6107540.23	255.28	20242-876	5.0	44 B	53	298 B	11 U	5.7 U B	11 U B	11 U B	2 J	57 U		30	
				20242-878	10.0	2.4 U	2.4 U	2.4 U	2.4 U	1.2 U B	2.4 U B	2.4 UJ B	1.2 U	3 J		12 U	
				20242-879	15.0	2.4 U	2.4 U	2.4 U	2.4 U	1.2 U B	2.4 U B	2.4 U B	1.2 U	12 U		12 U	
				20242-882	30.0	2.3 U	2.3 U	2.3 U	2.3 U	1.2 U B	2.3 U B	2.3 U B	1.2 U	12 U		12 U	
				20242-883 (Dup)	30.5	2.4 U	2.4 U	2.4 U	2.4 U	1.2 U B	2.4 U B	2.4 U B	1.2 U	12 U		12 U	
PB02	2189548.73	6107530.97	255.13	20242-884	5.0	2.3 U	0.7 J	2.3 U	2.3 U	1.2 U B	2.3 U B	2.3 U B	1.2 U	12 U		12 U	
				20242-886	15.0	2.1 U	2.1 U	2.1 U	2.1 U	1.1 U B	2.1 U	2.1 U	1.1 U	11 U		11 U	
				20242-887 (Dup)	15.5	2.2 U	2.2 U	2.2 U	2.2 U	1.1 U B	2.2 U	2.2 U	1.1 U	11 U		11 U	
				20242-890	30.0	2.3 U	2.3 U	2.3 U	2.3 U	1.1 U B	2.3 U B	2.3 U B	1.1 U	11 U		11 U	
PB03	2189559.42	6107530.44	255.36	20242-891	5.0	260 B	240 B	1570 B	46 U B Y	23 U B	46 U B	46 U B	23 U	230 U		11 U	
				20242-892	10.0	2.2 U	2.2 U	2.2 U	2.2 U	1.1 U B	2.2 U	2.2 UJ	1.1 U	3 J		11 U	
				20242-893	15.0	2.3 U	2.3 U	2.3 U	2.3 U	1.1 U B	2.3 U B	2.3 U B	1.1 U	11 U		11 U	
				20242-896	30.0	2.3 U	2.3 U	2.3 U	2.3 U	1.2 U B	2.3 U B	2.3 U B	1.2 U	12 U		12 U	

NAD 83 - North American Datum, 1983
ft - feet
msl - mean sea level datum
bgs - below ground surface
EPA - US Environmental Protection Agency
J - estimated value
OHM - OHM Remediation Services Corp.
B - Concentration above MCAS El Toro background
U - not detected at or above the stated reporting limit
UJ - estimated reporting limit
Y -
µg/kg - micrograms per kilogram



REVISIONS			
REV. No.	DESCRIPTION	DATE	APPROVED
01	97102-78B.DWG BY CALVADA SURVEYING, INC.	6/10/99	

EXPLANATION:

- PESTICIDE SAMPLE LOCATION
- HAND AUGER SAMPLE LOCATION
- SAMPLE LOCATION (PREVIOUS)
- SEWER MANHOLE
- TELEPHONE MANHOLE
- POWER POLE
- CHAIN LINK FENCE
- WATER VALVE
- EDGE OF PAVEMENT

CONTRACT NAME SWDIV		OHM Remediation Services Corp. A Subsidiary of OHM Corporation IRVINE, CA					
DRAWN BY R. PIRMORADIAN	DATE 5/8/00	SITE MAP MSC-P1 FORMER PESTICIDE STORAGE AREA 493 MARINE CORPS AIR STATION EL TORO, CALIFORNIA					
CHECKED BY	DATE						
APPROVED BY	DATE						
PROJECT MANAGER	DATE						
AUTOCAD FILE No. 20242171.DWG		SCALE 1"=40'	SHEET 1	OF 1	DOCUMENT CONTROL No. SW7998	OHM PROJECT No. 20242	DRAWING No. FIG 3-2

Appendix C
Risk Reevaluation Worksheets

Table C-1: Summary of Risks and Hazard Indices for Residential Scenario at Site 8, Units 1 and 4

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
1,3-Dichlorobenzene	--	--	--	--	8.1E-06	8.0E-05	8.0E-05	0.02%
2-Hexanone	--	--	--	--	1.2E-07	7.1E-06	7.1E-06	0.002%
Toluene	--	--	--	--	1.1E-06	9.5E-06	9.5E-06	0.002%
Benz(a)anthracene	6.4E-10	4.7E-09	5.3E-09	0.1%	1.3E-07	3.7E-06	3.7E-06	0.001%
Benzo(a)pyrene	2.3E-07	1.7E-06	1.9E-06	52%	4.7E-06	1.4E-04	1.4E-04	0.03%
Benzo(b)fluoranthene	1.2E-09	9.0E-09	1.0E-08	0.3%	2.5E-07	7.2E-06	7.2E-06	0.002%
Benzo(g,h,i)perylene	--	--	--	--	4.4E-06	1.3E-04	1.3E-04	0.03%
Bis(2-ethylhexyl)phthalate	1.1E-09	8.3E-09	9.4E-09	0.3%	1.2E-05	3.4E-04	3.4E-04	0.1%
Butyl benzyl phthalate	--	--	--	--	8.8E-07	2.5E-05	2.5E-05	0.01%
Chrysene	8.3E-12	6.0E-11	6.9E-11	0.002%	1.7E-07	4.8E-06	4.8E-06	0.001%
Di-n-butyl phthalate	--	--	--	--	1.9E-06	5.6E-05	5.6E-05	0.01%
Indeno(1,2,3-cd)pyrene	2.3E-08	1.7E-07	1.9E-07	5%	4.7E-06	1.4E-04	1.4E-04	0.03%
4,4'-DDD	7.8E-11	6.1E-10	6.8E-10	0.02%	1.9E-06	5.9E-05	5.9E-05	0.01%
4,4'-DDE	1.0E-10	8.0E-10	9.1E-10	0.02%	1.8E-06	5.5E-05	5.5E-05	0.01%
4,4'-DDT	1.9E-10	1.4E-09	1.6E-09	0.04%	3.2E-06	9.9E-05	9.9E-05	0.02%
Aldrin	4.1E-09	3.2E-08	3.6E-08	1%	2.3E-05	7.3E-04	7.3E-04	0.2%
alpha-BHC	3.0E-10	2.3E-09	2.6E-09	0.1%	1.1E-10	3.3E-09	3.3E-09	0.000001%
alpha-Chlordane	5.4E-11	4.2E-10	4.7E-10	0.01%	8.9E-07	2.8E-05	2.8E-05	0.01%
Aroclor 1248	1.2E-07	9.1E-07	1.0E-06	28%	9.1E-03	2.6E-01	2.6E-01	56%
Aroclor 1254	7.7E-09	5.6E-08	6.4E-08	2%	5.6E-04	1.6E-02	1.6E-02	3%
Aroclor 1260	1.0E-08	7.3E-08	8.3E-08	2%	7.3E-04	2.1E-02	2.1E-02	4%
Dieldrin	4.8E-09	3.7E-08	4.2E-08	1%	1.8E-05	5.5E-04	5.5E-04	0.1%
Endosulfan I	--	--	--	--	5.0E-06	1.5E-04	1.5E-04	0.03%
Endosulfan II	--	--	--	--	1.5E-07	4.6E-06	4.6E-06	0.001%
Endosulfan sulfate	--	--	--	--	1.4E-07	4.4E-06	4.4E-06	0.001%
Endrin	--	--	--	--	2.8E-06	8.7E-05	8.7E-05	0.02%
Endrin aldehyde	--	--	--	--	3.1E-06	9.6E-05	9.6E-05	0.02%
Endrin ketone	--	--	--	--	2.8E-06	8.7E-05	8.7E-05	0.02%
gamma-BHC (Lindane)	2.1E-10	1.6E-09	1.8E-09	0.05%	1.6E-06	4.9E-05	4.9E-05	0.01%
gamma-Chlordane	5.4E-11	4.2E-10	4.7E-10	0.01%	8.9E-07	2.8E-05	2.8E-05	0.01%
Heptachlor	1.1E-09	8.4E-09	9.5E-09	0.3%	1.4E-06	4.4E-05	4.4E-05	0.01%
Heptachlor epoxide	4.7E-09	3.6E-08	4.1E-08	1%	1.2E-04	3.6E-03	3.6E-03	1%
Methoxychlor	--	--	--	--	4.0E-07	1.2E-05	1.2E-05	0.003%
Toxaphene	3.0E-08	2.3E-07	2.6E-07	7%	2.7E-03	8.3E-02	8.3E-02	18%
Aluminum	--	--	--	--	--	--	--	--
Antimony	--	--	--	--	--	--	--	--
Arsenic	--	--	--	--	--	--	--	--
Barium	--	--	--	--	--	--	--	--
Beryllium	--	--	--	--	--	--	--	--
Cadmium	3.6E-10	7.5E-10	1.1E-09	0.03%	2.2E-03	7.3E-02	7.3E-02	15%
Chromium	--	--	--	--	--	--	--	--
Cobalt	--	--	--	--	--	--	--	--
Copper	--	--	--	--	1.1E-04	3.6E-03	3.6E-03	1%
Lead	--	--	--	--	--	--	--	--
Manganese	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--
Nickel	--	--	--	--	--	--	--	--
Selenium	--	--	--	--	--	--	--	--
Silver	--	--	--	--	1.9E-05	6.1E-04	6.1E-04	0.1%
Vanadium	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	8.2E-05	2.7E-03	2.7E-03	1%
Revised Cumulative Risk and Cumulative Hazard Index:	3.7E-06				0.47			

Notes:

^a - ED = Exposure Duration

^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.

^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

Table C-2: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 8, Units 1 and 4

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
1,3-Dichlorobenzene	4	1	0.001	--	9.0E-04	--	9.0E-04	0.1	1.2E+04	--	--	--	--	--	4.3E-07	1.7E-07	7.5E-06	8.1E-06	0.1%
2-Hexanone	19	1	0.013	--	6.0E-02	--	5.7E-02	0.1	4.1E+04	--	--	--	--	--	8.5E-08	3.4E-08	1.4E-11	1.2E-07	0.001%
Toluene	23	5	0.0055	--	2.0E-01	--	1.1E-01	0.1	3.6E+03	--	--	--	--	--	1.1E-08	4.3E-09	1.1E-06	1.1E-06	0.01%
Benz(a)anthracene	5	1	0.0041	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	4.0E-10	2.4E-10	2.6E-14	6.4E-10	0.1%	8.0E-08	4.8E-08	2.8E-10	1.3E-07	0.001%
Benzo(a)pyrene	6	2	0.15	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	--	1.5E-07	8.8E-08	9.4E-12	2.3E-07	52%	2.9E-06	1.8E-06	1.0E-08	4.7E-06	0.03%
Benzo(b)fluoranthene	5	1	0.0079	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	7.7E-10	4.6E-10	5.0E-14	1.2E-09	0.3%	1.5E-07	9.3E-08	5.4E-10	2.5E-07	0.002%
Benzo(g,h,i)perylene	6	2	0.14	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	2.7E-06	1.6E-06	9.6E-09	4.4E-06	0.03%
Bis(2-ethylhexyl)phthalate	19	6	0.38	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.15	--	7.1E-10	4.3E-10	1.1E-13	1.1E-09	0.3%	7.4E-06	4.5E-06	1.0E-09	1.2E-05	0.1%
Butyl benzyl phthalate	2	2	0.28	--	2.0E-01	--	2.0E-01	0.15	--	--	--	--	--	--	5.5E-07	3.3E-07	8.3E-11	8.8E-07	0.01%
Chrysene	5	1	0.0053	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	--	5.2E-12	3.1E-12	3.3E-16	8.3E-12	0.002%	1.0E-07	6.2E-08	3.7E-10	1.7E-07	0.00%
Di-n-butyl phthalate	2	2	0.31	--	1.0E-01	--	1.0E-01	0.15	--	--	--	--	--	--	1.2E-06	7.3E-07	1.8E-10	1.9E-06	0.01%
Indeno(1,2,3-cd)pyrene	6	1	0.15	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	1.5E-08	8.8E-09	9.4E-13	2.3E-08	5%	2.9E-06	1.8E-06	1.0E-08	4.7E-06	0.03%
4,4'-DDD	39	11	0.00202	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	6.5E-11	1.3E-11	9.8E-15	7.8E-11	0.02%	1.6E-06	3.2E-07	2.4E-10	1.9E-06	0.01%
4,4'-DDE	39	9	0.00189	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	8.6E-11	1.7E-11	1.3E-14	1.0E-10	0.02%	1.5E-06	3.0E-07	2.2E-10	1.8E-06	0.01%
4,4'-DDT	39	18	0.00341	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	1.6E-10	3.1E-11	2.4E-14	1.9E-10	0.04%	2.7E-06	5.3E-07	4.0E-10	3.2E-06	0.02%
Aldrin	37	2	0.0015	1.7E+01	3.0E-05	1.7E+01	3.0E-05	0.05	--	3.4E-09	6.8E-10	5.2E-13	4.1E-09	1%	2.0E-05	3.9E-06	3.0E-09	2.3E-05	0.1%
alpha-BHC	1	1	0.000294	6.3E+00	1.3E+00	6.3E+00	1.3E+00	0.05	--	2.5E-10	5.0E-11	3.8E-14	3.0E-10	0.1%	8.9E-11	1.8E-11	1.3E-14	1.1E-10	0.000%
alpha-Chlordane	39	6	0.00095	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	4.5E-11	8.9E-12	6.8E-15	5.4E-11	0.01%	7.4E-07	1.5E-07	2.8E-10	8.9E-07	0.01%
Aroclor 1248	39	1	0.297	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	8.0E-08	4.5E-08	1.2E-11	1.2E-07	28%	5.8E-03	3.2E-03	8.8E-07	9.1E-03	58%
Aroclor 1254	39	9	0.0185	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	5.0E-09	2.8E-09	7.5E-13	7.7E-09	2%	3.6E-04	2.0E-04	5.5E-08	5.6E-04	4%
Aroclor 1260	39	8	0.0238	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	6.4E-09	3.6E-09	9.7E-13	1.0E-08	2%	4.7E-04	2.6E-04	7.1E-08	7.3E-04	5%
Dieldrin	39	9	0.00187	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	--	4.0E-09	8.0E-10	6.1E-13	4.8E-09	1%	1.5E-05	2.9E-06	2.2E-09	1.8E-05	0.1%
Endosulfan I	39	2	0.0635	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	4.1E-06	8.3E-07	6.3E-10	5.0E-06	0.03%
Endosulfan II	39	12	0.00191	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	1.2E-07	2.5E-08	1.9E-11	1.5E-07	0.001%
Endosulfan sulfate	37	6	0.0018	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	1.2E-07	2.3E-08	1.8E-11	1.4E-07	0.001%
Endrin	39	4	0.0018	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	2.3E-06	4.7E-07	3.6E-10	2.8E-06	0.02%
Endrin aldehyde	39	13	0.00197	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	2.6E-06	5.1E-07	3.9E-10	3.1E-06	0.02%
Endrin ketone	37	5	0.0018	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	2.3E-06	4.7E-07	3.6E-10	2.8E-06	0.02%
gamma-BHC (Lindane)	36	1	0.001	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	--	1.7E-10	3.5E-11	2.6E-14	2.1E-10	0.05%	1.3E-06	2.6E-07	2.0E-10	1.6E-06	0.01%
gamma-Chlordane	39	8	0.00095	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	4.5E-11	8.9E-12	6.8E-15	5.4E-11	0.01%	7.4E-07	1.5E-07	2.8E-10	8.9E-07	0.01%
Heptachlor	37	2	0.0015	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	--	9.1E-10	1.8E-10	1.4E-13	1.1E-09	0.2%	1.2E-06	2.3E-07	1.8E-10	1.4E-06	0.01%
Heptachlor epoxide	37	2	0.0032	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	--	3.9E-09	7.8E-10	5.9E-13	4.7E-09	1%	9.6E-05	1.9E-05	1.5E-08	1.2E-04	1%
Methoxychlor	2	2	0.00428	--	5.0E-03	--	5.0E-03	0.05	--	--	--	--	--	--	3.4E-07	6.7E-08	5.1E-11	4.0E-07	0.003%
Toxaphene	24	1	0.17	1.1E+00	3.0E-05	1.1E+00	3.0E-05	0.05	--	2.5E-08	5.0E-09	3.9E-12	3.0E-08	7%	2.2E-03	4.4E-04	3.4E-07	2.7E-03	17%
Aluminum	27	27	--	--	1.0E+00	--	1.4E-03	0.01	--	--	--	--	--	--	--	--	--	--	--
Antimony	25	3	--	--	4.0E-04	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Arsenic	27	23	--	1.5E+00	3.0E-04	1.5E+01	--	0.03	--	--	--	--	--	--	--	--	--	--	--
Barium	27	27	--	--	7.0E-02	--	1.4E-04	0.01	--	--	--	--	--	--	--	--	--	--	--
Beryllium	18	9	--	--	2.0E-03	8.4E+00	5.7E-06	0.01	--	--	--	3.6E-10	3.6E-10	0.1%	2.2E-03	8.9E-06	--	2.2E-03	14%
Cadmium	27	26	2.84	--	5.0E-04	6.3E+00	--	0.001	--	--	--	--	--	--	--	--	--	--	--
Chromium	27	27	--	--	--	4.2E+01	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Cobalt	27	21	--	--	6.0E-02	--	--	0.01	--	--	--	--	--	--	1.1E-04	4.3E-06	--	1.1E-04	1%
Copper	27	27	10.3	--	3.7E-02	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Lead	27	26	12.9	--	--	--	1.4E-05	0.01	--	--	--	--	--	--	--	--	--	--	--
Manganese	27	27	--	--	2.4E-02	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Mercury	10	2	--	--	--	--	8.6E-05	0.01	--	--	--	--	--	--	--	--	--	--	--
Nickel	26	20	--	--	2.0E-02	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Selenium	11	1	--	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	1.8E-05	7.3E-07	--	1.9E-05	0.1%
Silver	27	7	0.233	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Vanadium	27	27	--	--	7.0E-03	--	--	0.01	--	--	--	--	--	--	7.9E-05	3.2E-06	--	8.2E-05	1%
Zinc	27	27	60.7	--	3.0E-01	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--

Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report^(a):

TOTAL RISK: 4.5E-07

TOTAL HI: 0.02

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	100	mg/d
Conversion Factor (CF) =	1.0E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	100	d/yr
Exposure Duration (ED) =	24	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	8760	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	5700	cm ² /event
Soil Adherence Factor (AF) =	0.07	mg/cm ²
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
ATc =	25550	days
ATnc =	8760	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	8760	days

Notes:

NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-3: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 8, Units 1 and 4

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
1,3-Dichlorobenzene	4	1	0.001	--	9.0E-04	--	9.0E-04	0.1	1.2E+04	--	--	--	--	--	1.4E-05	4.0E-06	6.2E-05	8.0E-05	0.02%
2-Hexanone	19	1	0.013	--	6.0E-02	--	5.7E-02	0.1	4.1E+04	--	--	--	--	--	2.8E-06	7.8E-07	3.6E-06	7.1E-06	0.002%
Toluene	23	5	0.0055	--	2.0E-01	--	1.1E-01	0.1	3.6E+03	--	--	--	--	--	3.5E-07	9.8E-08	9.1E-06	9.5E-06	0.002%
Benz(a)anthracene	5	1	0.0041	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	3.3E-09	1.4E-09	5.3E-14	4.7E-09	0.1%	2.6E-06	1.1E-06	2.3E-09	3.7E-06	0.0008%
Benzo(a)pyrene	6	2	0.15	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	--	1.2E-06	5.0E-07	2.0E-11	1.7E-06	52%	9.6E-05	4.0E-05	8.5E-08	1.4E-04	0.03%
Benzo(b)fluoranthene	5	1	0.0079	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	6.3E-09	2.7E-09	1.0E-13	9.0E-09	0.3%	5.1E-06	2.1E-06	4.5E-09	7.2E-06	0.002%
Benzo(g,h,i)perylene	6	2	0.14	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	8.9E-05	3.8E-05	8.0E-08	1.3E-04	0.03%
Bis(2-ethylhexyl)phthalate	19	6	0.38	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.15	--	5.8E-09	2.4E-09	2.2E-13	8.3E-09	0.3%	2.4E-04	1.0E-04	8.5E-09	3.4E-04	0.07%
Butyl benzyl phthalate	2	2	0.28	--	2.0E-01	--	2.0E-01	0.15	--	--	--	--	--	--	1.8E-05	7.5E-06	6.9E-10	2.5E-05	0.005%
Chrysene	5	1	0.0053	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	--	4.2E-11	1.8E-11	6.9E-16	6.0E-11	0.002%	3.4E-06	1.4E-06	3.0E-09	4.8E-06	0.001%
Di-n-butyl phthalate	2	2	0.31	--	1.0E-01	--	1.0E-01	0.15	--	--	--	--	--	--	4.0E-05	1.7E-05	1.5E-09	5.6E-05	0.01%
Indeno(1,2,3-cd)pyrene	6	1	0.15	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	1.2E-07	5.0E-08	2.0E-12	1.7E-07	5%	9.6E-05	4.0E-05	8.5E-08	1.4E-04	0.03%
4,4'-DDD	39	11	0.00202	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	5.3E-10	7.4E-11	2.0E-14	6.1E-10	0.02%	5.2E-05	7.2E-06	2.0E-09	5.9E-05	0.01%
4,4'-DDE	39	9	0.00189	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	7.0E-10	9.9E-11	2.7E-14	8.0E-10	0.02%	4.8E-05	6.8E-06	1.9E-09	5.5E-05	0.01%
4,4'-DDT	39	18	0.00341	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	1.3E-09	1.8E-10	4.9E-14	1.4E-09	0.04%	8.7E-05	1.2E-05	3.3E-09	9.9E-05	0.02%
Aldrin	37	2	0.0015	1.7E+01	3.0E-05	1.7E+01	3.0E-05	0.05	--	2.8E-08	3.9E-09	1.1E-12	3.2E-08	1%	6.4E-04	8.9E-05	2.4E-08	7.3E-04	0.2%
alpha-BHC	1	1	0.000294	6.3E+00	1.3E+00	6.3E+00	1.3E+00	0.05	--	2.0E-09	2.8E-10	7.8E-14	2.3E-09	0.07%	2.9E-09	4.0E-10	1.1E-13	3.3E-09	0.000001%
alpha-Chlordane	39	6	0.00095	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	3.6E-10	5.1E-11	1.4E-14	4.2E-10	0.01%	2.4E-05	3.4E-06	2.3E-09	2.8E-05	0.006%
Aroclor 1248	39	1	0.297	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	6.5E-07	2.6E-07	2.5E-11	9.1E-07	28%	1.9E-01	7.4E-02	7.3E-06	1.6E-01	56%
Aroclor 1254	39	9	0.0185	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	4.1E-08	1.6E-08	1.6E-12	5.6E-08	2%	1.2E-02	4.6E-03	4.5E-07	2.6E-02	3%
Aroclor 1260	39	8	0.0238	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	5.2E-08	2.0E-08	2.0E-12	7.3E-08	2%	1.5E-02	6.0E-03	5.8E-07	2.1E-02	4%
Dieldrin	39	9	0.00187	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	--	3.3E-08	4.6E-09	1.3E-12	3.7E-08	1%	4.8E-04	6.7E-05	1.8E-08	5.5E-04	0.1%
Endosulfan I	39	2	0.0635	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	1.4E-04	1.9E-05	5.2E-09	1.5E-04	0.03%
Endosulfan II	39	12	0.00191	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	4.1E-06	5.7E-07	1.6E-10	4.6E-06	0.001%
Endosulfan sulfate	37	6	0.0018	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	3.8E-06	5.4E-07	1.5E-10	4.4E-06	0.001%
Endrin	39	4	0.0018	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	7.7E-05	1.1E-05	2.9E-09	8.7E-05	0.02%
Endrin aldehyde	39	13	0.00197	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	8.4E-05	1.2E-05	3.2E-09	9.6E-05	0.02%
Endrin ketone	37	5	0.0018	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	7.7E-05	1.1E-05	2.9E-09	8.7E-05	0.02%
gamma-BHC (Lindane)	36	1	0.001	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	--	1.4E-09	2.0E-10	5.5E-14	1.6E-09	0.05%	4.3E-05	6.0E-06	1.6E-09	4.9E-05	0.01%
gamma-Chlordane	39	8	0.00095	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	3.6E-10	5.1E-11	1.4E-14	4.2E-10	0.01%	2.4E-05	3.4E-06	2.3E-09	2.8E-05	0.01%
Heptachlor	37	2	0.0015	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	--	7.4E-09	1.0E-09	2.9E-13	8.4E-09	0.3%	3.8E-05	5.4E-06	1.5E-09	4.4E-05	0.01%
Heptachlor epoxide	37	2	0.0032	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	--	3.2E-08	4.5E-09	1.2E-12	3.6E-08	1%	3.1E-03	4.4E-04	1.2E-07	3.6E-03	1%
Methoxychlor	2	2	0.00428	--	5.0E-03	--	5.0E-03	0.05	--	--	--	--	--	--	1.1E-05	1.5E-06	4.2E-10	1.2E-05	0.003%
Toxaphene	24	1	0.17	1.1E+00	3.0E-05	1.1E+00	3.0E-05	0.05	--	2.0E-07	2.9E-08	8.0E-12	2.3E-07	7%	7.2E-02	1.0E-02	2.8E-06	8.3E-02	18%
Aluminum	27	27	--	--	1.0E+00	--	1.4E-03	0.01	--	--	--	--	--	--	--	--	--	--	--
Antimony	25	3	--	--	4.0E-04	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Arsenic	27	23	--	1.5E+00	3.0E-04	1.5E+01	--	0.03	--	--	--	--	--	--	--	--	--	--	--
Barium	27	27	--	--	7.0E-02	--	1.4E-04	0.01	--	--	--	--	--	--	--	--	--	--	--
Beryllium	27	9	--	--	2.0E-03	8.4E+00	5.7E-06	0.01	--	--	--	--	--	--	--	--	--	--	--
Cadmium	27	26	2.84	--	5.0E-04	6.3E+00	--	0.001	--	--	--	7.5E-10	7.5E-10	0.02%	7.3E-02	2.0E-04	--	7.3E-02	15%
Chromium	27	27	--	--	--	4.2E+01	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Cobalt	27	21	--	--	6.0E-02	--	--	0.01	--	--	--	--	--	--	3.5E-03	9.9E-05	--	3.6E-03	1%
Copper	27	27	10.3	--	3.7E-02	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Lead	27	26	12.9	--	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Manganese	27	27	--	--	2.4E-02	--	1.4E-05	0.01	--	--	--	--	--	--	--	--	--	--	--
Mercury	27	2	--	--	--	--	8.6E-05	0.01	--	--	--	--	--	--	--	--	--	--	--
Nickel	27	21	--	--	2.0E-02	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Selenium	20	1	--	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	6.0E-04	1.7E-05	--	6.1E-04	0.1%
Silver	27	7	0.233	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Vanadium	27	27	--	--	7.0E-03	--	--	0.01	--	--	--	--	--	--	2.6E-03	7.2E-05	--	2.7E-03	1%
Zinc	27	27	60.7	--	3.0E-01	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--

Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report^(a):

TOTAL RISK: 3.3E-06

TOTAL HI: 0.47

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	200	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	350	d/yr
Exposure Duration (ED) =	6	yr
Body Weight (BW) =	15	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	2190	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	2800	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
ATc =	25550	days
ATnc =	2190	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.42	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	2190	days

Notes:

NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-4: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 8, Units 1 and 4

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
1,3-Dichlorobenzene	3	1	0.001	—	9.0E-04	—	9.0E-04	0.1	1.2E+04	—	—	—	—	—	5.4E-07	7.2E-07	6.2E-06	7.5E-06	0.02%
2-Hexanone	13	1	0.013	—	6.0E-02	—	5.7E-02	0.1	4.1E+04	—	—	—	—	—	1.1E-07	1.4E-07	3.6E-07	6.1E-07	0.002%
Toluene	16	4	0.0055	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	1.3E-08	1.8E-08	9.1E-07	9.5E-07	0.002%
Benz(a)anthracene	4	1	0.0041	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	5.2E-10	1.0E-09	2.2E-14	1.6E-09	0.1%	1.0E-07	2.0E-07	2.4E-10	3.0E-07	0.001%
Benzo(a)pyrene	5	2	0.15	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	1.9E-07	3.8E-07	8.2E-12	5.7E-07	50%	3.7E-06	7.3E-06	8.6E-09	1.1E-05	0.03%
Benzo(b)fluoranthene	4	1	0.0079	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.0E-09	2.0E-09	4.3E-14	3.0E-09	0.3%	1.9E-07	3.8E-07	4.5E-10	5.8E-07	0.001%
Benzo(g,h,i)perylene	5	2	0.14	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	3.4E-06	6.8E-06	8.0E-09	1.0E-05	0.03%
Bis(2-ethylhexyl)phthalate	13	6	0.44	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.15	—	1.1E-09	2.1E-09	1.1E-13	3.2E-09	0.3%	1.1E-05	2.1E-05	9.9E-10	3.2E-05	0.08%
Butyl benzyl phthalate	2	2	0.28	—	2.0E-01	—	2.0E-01	0.15	—	—	—	—	—	—	6.8E-07	1.4E-06	6.9E-11	2.0E-06	0.01%
Chrysene	4	1	0.0053	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	6.8E-12	1.3E-11	2.9E-16	2.0E-11	0.002%	1.3E-07	2.6E-07	3.0E-10	3.9E-07	0.001%
Di-n-butyl phthalate	2	2	0.31	—	1.0E-01	—	1.0E-01	0.15	—	—	—	—	—	—	1.5E-06	3.0E-06	1.5E-10	4.5E-06	0.01%
Indeno(1,2,3-cd)pyrene	5	1	0.15	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.9E-08	3.8E-08	8.2E-13	5.7E-08	5%	3.7E-06	7.3E-06	8.6E-09	1.1E-05	0.03%
4,4'-DDD	26	11	0.0167	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	7.0E-10	4.6E-10	7.1E-14	1.2E-09	0.1%	1.6E-05	1.1E-05	1.6E-09	2.7E-05	0.07%
4,4'-DDE	26	9	0.013	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	7.7E-10	5.1E-10	7.8E-14	1.3E-09	0.1%	1.3E-05	8.4E-06	1.3E-09	2.1E-05	0.05%
4,4'-DDT	26	16	0.0172	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.0E-09	6.7E-10	1.0E-13	1.7E-09	0.1%	1.7E-05	1.1E-05	1.7E-09	2.8E-05	0.07%
Aldrin	24	1	0.0012	1.7E+01	3.0E-05	1.7E+01	3.0E-05	0.05	—	3.6E-09	2.4E-09	3.6E-13	5.9E-09	1%	2.0E-05	1.3E-05	2.0E-09	3.2E-05	0.08%
alpha-BHC	1	1	0.000294	6.3E+00	1.3E+00	6.3E+00	1.3E+00	0.05	—	3.2E-10	2.1E-10	3.3E-14	5.4E-10	0.05%	1.1E-10	7.3E-11	1.1E-14	1.8E-10	0.0000005%
alpha-Chlordane	26	6	0.00095	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	5.8E-11	3.8E-11	5.9E-15	9.6E-11	0.01%	9.3E-07	6.1E-07	2.3E-10	1.5E-06	0.004%
Aroclor 1248	26	1	0.297	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	1.0E-07	1.9E-07	1.0E-11	3.0E-07	26%	7.3E-03	1.3E-02	7.3E-07	2.1E-02	53%
Aroclor 1254	26	9	0.0209	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	7.3E-09	1.3E-08	7.4E-13	2.1E-08	2%	5.1E-04	9.4E-04	5.2E-08	1.5E-03	4%
Aroclor 1260	26	7	0.0997	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	3.5E-08	6.4E-08	3.5E-12	9.9E-08	9%	2.4E-03	4.5E-03	2.5E-07	6.9E-03	18%
Dieldrin	26	8	0.0037	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	1.0E-08	6.8E-09	1.1E-12	1.7E-08	2%	3.6E-05	2.4E-05	3.7E-09	6.0E-05	0.2%
Endosulfan I	26	2	0.0635	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	5.2E-06	3.4E-06	5.2E-10	8.6E-06	0.02%
Endosulfan II	26	11	0.00877	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	7.2E-07	4.7E-07	7.2E-11	1.2E-06	0.003%
Endosulfan sulfate	24	6	0.0018	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.5E-07	9.7E-08	1.5E-11	2.4E-07	0.001%
Endrin	26	3	0.064	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	1.0E-04	6.9E-05	1.1E-08	1.7E-04	0.4%
Endrin aldehyde	26	12	0.00637	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	1.0E-05	6.9E-06	1.0E-09	1.7E-05	0.04%
Endrin ketone	24	5	0.0018	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	2.9E-06	1.9E-06	3.0E-10	4.9E-06	0.01%
gamma-Chlordane	26	7	0.00091	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	5.6E-11	3.7E-11	5.6E-15	9.2E-11	0.01%	8.9E-07	5.9E-07	2.2E-10	1.5E-06	0.004%
Heptachlor	22	1	0.00095	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	—	7.5E-10	4.9E-10	7.6E-14	1.2E-09	0.1%	9.3E-07	6.1E-07	9.4E-11	1.5E-06	0.004%
Heptachlor epoxide	24	1	0.0032	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	—	5.1E-09	3.4E-09	5.1E-13	8.4E-09	1%	1.2E-04	7.9E-05	1.2E-08	2.0E-04	1%
Methoxychlor	2	2	0.00428	—	5.0E-03	—	5.0E-03	0.05	—	—	—	—	—	—	4.2E-07	2.8E-07	4.2E-11	7.0E-07	0.002%
Toxaphene	17	1	0.17	1.1E+00	3.0E-05	1.1E+00	3.0E-05	0.05	—	3.3E-08	2.2E-08	3.4E-12	5.4E-08	5%	2.8E-03	1.8E-03	2.8E-07	4.6E-03	12%
Aluminum	19	19	—	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	—	—	—	—	—
Antimony	17	2	—	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Arsenic	19	15	—	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	—	—	—	—	—	—	—	—	—	—
Barium	19	19	—	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	—	—	—	—	—
Beryllium	19	8	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	19	19	4.02	—	5.0E-04	6.3E+00	—	0.001	—	—	—	4.5E-10	4.5E-10	0.04%	3.9E-03	5.2E-05	—	4.0E-03	10%
Chromium	19	19	—	—	—	4.2E+01	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Cobalt	19	14	—	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Copper	19	19	24.9	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	3.3E-04	4.3E-05	—	3.7E-04	1%
Lead	19	18	1300	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	19	19	—	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	—	—	—	—	—
Mercury	19	1	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	—	—	—
Nickel	19	16	—	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Selenium	14	1	—	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	6.9E-05	9.1E-06	—	7.8E-05	0.2%
Silver	19	7	0.704	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	19	19	—	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Zinc	19	19	78.6	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	1.3E-04	1.7E-05	—	1.5E-04	0.4%

Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report^(a):

TOTAL RISK: 1.1E-06

TOTAL HI: 0.039

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	50	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	250	d/yr
Exposure Duration (ED) =	25	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	9125	days

Dermal Contact with Soil or Sediment:

CF =	1.00E-06	kg/mg
Body Surface Area (SA) =	3300	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
ATc =	25550	days
ATnc =	9125	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	8	hr/day
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg
ATc =	25550	days
ATnc =	9125	days

Notes:

NA = Not available or not applicable
— = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were revised in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-5: Summary of Risks and Hazard Indices for Residential Scenario at Site 8, Units 2 and 3

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
1,1,2-Trichloro-1,2,2-trifluoroethane	--	--	--	--	8.7E-09	7.2E-08	7.2E-08	0.00001%
1,3-Dichlorobenzene	--	--	--	--	1.1E-05	1.1E-04	1.1E-04	0.01%
1,4-Dichlorobenzene	4.4E-11	1.1E-10	1.6E-10	0.001%	3.9E-08	6.7E-07	6.7E-07	0.0001%
2-Butanone	--	--	--	--	6.0E-08	5.7E-07	5.7E-07	0.00005%
Acetone	--	--	--	--	1.4E-05	1.4E-04	1.4E-04	0.01%
Dichlorodifluoromethane	--	--	--	--	1.0E-06	8.5E-06	8.5E-06	0.001%
Ethylbenzene	--	--	--	--	1.4E-07	1.4E-06	1.4E-06	0.0001%
m,p-Xylene	--	--	--	--	2.2E-07	1.9E-06	1.9E-06	0.0002%
o-Xylene	--	--	--	--	8.7E-08	7.2E-07	7.2E-07	0.0001%
Tetrachloroethene	4.6E-11	1.8E-10	2.3E-10	0.002%	4.6E-07	5.8E-06	5.8E-06	0.0005%
Toluene	--	--	--	--	1.6E-06	1.4E-05	1.4E-05	0.001%
Xylenes	--	--	--	--	1.4E-06	1.2E-05	1.2E-05	0.001%
Benzo(b)fluoranthene	1.1E-09	7.8E-09	8.9E-09	0.1%	2.2E-07	6.3E-06	6.3E-06	0.001%
Benzo(g,h,i)perylene	--	--	--	--	2.7E-07	7.7E-06	7.7E-06	0.001%
Bis(2-ethylhexyl)phthalate	4.2E-09	3.1E-08	3.5E-08	0.3%	4.4E-05	1.3E-03	1.3E-03	0.1%
Butyl benzyl phthalate	--	--	--	--	1.1E-06	3.1E-05	3.1E-05	0.002%
Chrysene	6.7E-11	4.9E-10	5.6E-10	0.01%	1.3E-06	3.9E-05	3.9E-05	0.003%
Dibenz(a,h)anthracene	4.5E-08	3.3E-07	3.7E-07	3%	9.1E-07	2.6E-05	2.6E-05	0.002%
Indeno(1,2,3-cd)pyrene	1.7E-08	1.2E-07	1.4E-07	1%	3.4E-06	1.0E-04	1.0E-04	0.01%
4,4'-DDT	3.7E-10	2.9E-09	3.2E-09	0.03%	6.3E-06	2.0E-04	2.0E-04	0.02%
Aroclor 1248	1.0E-07	7.4E-07	8.5E-07	8%	7.4E-03	2.2E-01	2.2E-01	17%
Aroclor 1254	1.7E-07	1.2E-06	1.4E-06	13%	1.2E-02	3.5E-01	3.5E-01	28%
Aroclor 1260	9.0E-08	6.5E-07	7.4E-07	7%	6.5E-03	1.9E-01	1.9E-01	15%
Dieldrin	3.2E-08	2.5E-07	2.8E-07	3%	1.2E-04	3.7E-03	3.7E-03	0.3%
gamma-Chlordane	7.2E-11	5.6E-10	6.3E-10	0.01%	1.2E-06	3.7E-05	3.7E-05	0.003%
Aluminum	--	--	--	--	--	--	--	--
Antimony	--	--	--	--	3.4E-03	1.1E-01	1.1E-01	9%
Arsenic	7.9E-07	6.2E-06	7.0E-06	65%	5.1E-03	1.6E-01	1.6E-01	13%
Barium	--	--	--	--	--	--	--	--
Beryllium	--	--	--	--	--	--	--	--
Cadmium	--	--	--	--	--	--	--	--
Chromium	--	--	--	--	--	--	--	--
Cobalt	--	--	--	--	5.1E-05	1.6E-03	1.6E-03	0.1%
Copper	--	--	--	--	1.5E-04	4.7E-03	4.7E-03	0.4%
Lead	--	--	--	--	--	--	--	--
Manganese	--	--	--	--	4.9E-03	1.3E-01	1.3E-01	11%
Mercury	--	--	--	--	--	--	--	--
Nickel	--	--	--	--	1.7E-04	5.6E-03	5.6E-03	0.5%
Silver	--	--	--	--	1.8E-05	5.9E-04	5.9E-04	0.05%
Thallium	--	--	--	--	--	--	--	--
Vanadium	--	--	--	--	1.8E-03	5.9E-02	5.9E-02	5%
Zinc	--	--	--	--	5.5E-05	1.8E-03	1.8E-03	0.1%
Revised Cumulative Risk and Cumulative Hazard Index:					1.1E-05	1.24		

Notes:

^a - ED = Exposure Duration^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

Table C-6: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 8, Units 2 and 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
1,1,2-Trichloro-1,2,2-trifluoroethane	7	1	0.0015	—	3.0E+01	—	8.6E+00	0.1	1.6E+03	—	—	—	—	—	2.0E-11	7.8E-12	8.7E-09	8.7E-09	0.00002%
1,3-Dichlorobenzene	7	1	0.0014	—	9.0E-04	—	9.0E-04	0.1	1.2E+04	—	—	—	—	—	6.1E-07	2.4E-07	1.0E-05	1.1E-05	0.03%
1,4-Dichlorobenzene	7	1	0.00088	2.4E-02	3.0E-02	2.2E-02	2.3E-01	0.1	1.3E+04	2.8E-12	1.1E-12	4.0E-11	4.4E-11	0.004%	1.1E-08	4.6E-09	2.3E-08	3.9E-08	0.0001%
2-Butanone	7	7	0.004	—	6.0E-01	—	2.9E-01	0.1	1.9E+04	—	—	—	—	—	2.6E-09	1.0E-09	5.6E-08	6.0E-08	0.0001%
Acetone	11	1	0.21	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	8.2E-07	3.3E-07	1.3E-05	1.4E-05	0.03%
Dichlorodifluoromethane	7	1	0.00079	—	2.0E-01	—	5.7E-02	0.1	1.1E+03	—	—	—	—	—	1.5E-09	6.2E-10	1.0E-06	1.0E-06	0.002%
Ethylbenzene	8	1	0.002	—	1.0E-01	—	2.9E-01	0.1	4.2E+03	—	—	—	—	—	7.8E-09	3.1E-09	1.3E-07	1.4E-07	0.0003%
m,p-Xylene	7	1	0.0025	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	4.9E-10	2.0E-10	2.2E-07	2.2E-07	0.001%
o-Xylene	7	1	0.00097	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	1.9E-10	7.6E-11	8.7E-08	8.7E-08	0.0002%
Tetrachloroethene	7	1	0.0017	5.2E-02	1.0E-02	2.0E-03	1.1E-01	0.1	3.2E+03	1.2E-11	4.7E-12	2.9E-11	4.6E-11	0.004%	6.7E-08	2.7E-08	3.6E-07	4.6E-07	0.001%
Toluene	18	2	0.008	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	1.6E-08	6.2E-09	1.6E-06	1.6E-06	0.004%
Xylenes	11	1	0.016	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	3.1E-09	1.2E-09	1.4E-06	1.4E-06	0.003%
Benzo(b)fluoranthene	12	1	0.0069	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	6.8E-10	4.0E-10	4.3E-14	1.1E-09	0.1%	1.4E-07	8.1E-08	4.8E-10	2.2E-07	0.001%
Benzo(g,h,i)perylene	12	4	0.0085	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	1.7E-07	1.0E-07	5.9E-10	2.7E-07	0.001%
Bis(2-ethylhexyl)phthalate	11	1	1.4	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.15	—	2.6E-09	1.6E-09	4.0E-13	4.2E-09	0.3%	2.7E-05	1.6E-05	3.8E-09	4.4E-05	0.1%
Butyl benzyl phthalate	7	6	0.34	—	2.0E-01	—	2.0E-01	0.15	—	—	—	—	—	—	6.7E-07	4.0E-07	1.0E-10	1.1E-06	0.003%
Chrysene	12	3	0.043	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	4.2E-11	2.5E-11	2.7E-15	6.7E-11	0.01%	8.4E-07	5.0E-07	3.0E-09	1.3E-06	0.003%
Dibenz(a,h)anthracene	12	1	0.029	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	2.8E-08	1.7E-08	1.8E-12	4.5E-08	4%	5.7E-07	3.4E-07	2.0E-09	9.1E-07	0.002%
Indeno(1,2,3-cd)pyrene	12	3	0.11	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.1E-08	6.4E-09	6.9E-13	1.7E-08	1%	2.2E-06	1.3E-06	7.6E-09	3.4E-06	0.008%
4,4'-DDT	46	1	0.00675	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	3.1E-10	6.1E-11	4.7E-14	3.7E-10	0.03%	5.3E-06	1.1E-06	8.0E-10	6.3E-06	0.02%
Aroclor 1248	49	1	0.244	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	6.5E-08	3.7E-08	9.9E-12	1.0E-07	8%	4.8E-03	2.7E-03	7.2E-07	7.4E-03	18%
Aroclor 1254	49	1	0.397	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	1.1E-07	6.0E-08	1.6E-11	1.7E-07	13%	7.8E-03	4.3E-03	1.2E-06	1.2E-02	29%
Aroclor 1260	49	1	0.214	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	5.7E-08	3.2E-08	8.7E-12	9.0E-08	7%	4.2E-03	2.3E-03	6.3E-07	6.5E-03	16%
Dieldrin	46	1	0.0126	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	2.7E-08	5.4E-09	4.1E-12	3.2E-08	3%	9.9E-05	2.0E-05	1.5E-08	1.2E-04	0.3%
gamma-Chlordane	45	1	0.00128	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	6.0E-11	1.2E-11	9.1E-15	7.2E-11	0.01%	1.0E-06	2.0E-07	3.8E-10	1.2E-06	0.003%
Aluminum	49	49	—	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	3.2E-03	1.3E-04	—	3.4E-03	8%
Antimony	14	3	3.3	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	4.5E-03	5.4E-04	—	5.1E-03	12%
Arsenic	49	43	3.48	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	7.0E-07	8.4E-08	1.1E-09	7.9E-07	63%	—	—	—	—	—
Barium	49	49	—	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	—	—	—	—	—
Beryllium	49	33	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	49	40	—	—	5.0E-04	6.3E+00	—	0.001	—	—	—	—	—	—	—	—	—	—	—
Chromium	49	49	—	—	—	4.2E+01	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Cobalt	49	47	7.48	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	4.9E-05	1.9E-06	—	5.1E-05	0.1%
Copper	49	49	13.4	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	1.4E-04	5.6E-06	—	1.5E-04	0.4%
Lead	49	49	—	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	49	49	229	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	3.7E-03	1.5E-04	9.7E-04	4.9E-03	12%
Mercury	49	16	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	—	—	—
Nickel	49	47	8.55	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	1.7E-04	6.7E-06	—	1.7E-04	0.4%
Silver	49	13	0.224	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	1.8E-05	7.0E-07	—	1.8E-05	0.04%
Thallium	49	10	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	49	49	31.5	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	1.8E-03	7.0E-05	—	1.8E-03	4%
Zinc	49	49	40.5	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	5.3E-05	2.1E-06	—	5.5E-05	0.1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 1.2E-06					TOTAL HI: 0.04				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	100	mg/d
Conversion Factor (CF) =	1.0E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	100	d/yr
Exposure Duration (ED) =	24	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	8760	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	5700	cm ² /event
Soil Adherence Factor (AF) =	0.07	mg/cm ²
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
ATc =	25550	days
ATnc =	8760	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	8760	days

Notes:

NA = Not available or not applicable	CSFo = Oral cancer slope factor (mg/kg-day) ⁻¹
— = Information not available or not applicable	CSFi = Inhalation cancer slope factor (mg/kg-day) ⁻¹
HI = Hazard index	RfDo = Oral reference dose (mg/kg-day)
HQ = Hazard quotient	RfDi = Inhalation reference dose (mg/kg-day)
mg/kg = Milligrams per kilogram	VOC = Volatile organic chemical
ABS = Dermal absorption factor (unitless)	
VF = Soil-to-air volatilization factor (m ³ /kg)	
EPC = Exposure point concentration	
^(a) Exposure parameters were updated in addition to toxicity factors	

Table C-7: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 8, Units 2 and 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
1,1,2-Trichloro-1,2,2-trifluoroethane	7	1	0.0015	—	3.0E+01	—	8.6E+00	0.1	1.6E+03	—	—	—	—	—	6.4E-10	1.8E-10	7.2E-08	7.2E-08	0.00001%
1,3-Dichlorobenzene	7	1	0.0014	—	9.0E-04	—	9.0E-04	0.1	1.2E+04	—	—	—	—	—	2.0E-05	5.6E-06	8.7E-05	1.1E-04	0.01%
1,4-Dichlorobenzene	7	1	0.00088	2.4E-02	3.0E-02	2.2E-02	2.3E-01	0.1	1.3E+04	2.3E-11	6.5E-12	8.3E-11	1.1E-10	0.001%	3.8E-07	1.1E-07	1.9E-07	6.7E-07	0.0001%
2-Butanone	7	7	0.004	—	6.0E-01	—	2.9E-01	0.1	1.9E+04	—	—	—	—	—	8.5E-08	2.4E-08	4.6E-07	5.7E-07	0.00005%
Acetone	11	1	0.21	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	2.7E-05	7.5E-06	1.1E-04	1.4E-04	0.01%
Dichlorodifluoromethane	7	1	0.00079	—	2.0E-01	—	5.7E-02	0.1	1.1E+03	—	—	—	—	—	5.1E-08	1.4E-08	8.4E-06	8.5E-06	0.0001%
Ethylbenzene	8	1	0.002	—	1.0E-01	—	2.9E-01	0.1	4.2E+03	—	—	—	—	—	2.6E-07	7.2E-08	1.1E-06	1.4E-06	0.0001%
m,p-Xylene	7	1	0.0025	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	1.6E-08	4.5E-09	1.8E-06	1.9E-06	0.0002%
o-Xylene	7	1	0.00097	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	6.2E-09	1.7E-09	7.2E-07	7.2E-07	0.0001%
Tetrachloroethene	7	1	0.0017	5.2E-02	1.0E-02	2.0E-03	1.1E-01	0.1	3.2E+03	9.7E-11	2.7E-11	6.0E-11	1.8E-10	0.002%	2.2E-06	6.1E-07	3.0E-06	5.8E-06	0.0005%
Toluene	18	2	0.008	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	5.1E-07	1.4E-07	1.3E-05	1.4E-05	0.001%
Xylenes	11	1	0.016	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	1.0E-07	2.9E-08	1.2E-05	1.2E-05	0.001%
Benzo(b)fluoranthene	12	1	0.0069	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	5.5E-09	2.3E-09	9.0E-14	7.8E-09	0.1%	4.4E-06	1.9E-06	3.9E-09	6.3E-06	0.001%
Benzo(g,h,i)perylene	12	4	0.0085	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	5.4E-06	2.3E-06	4.8E-09	7.7E-06	0.001%
Bis(2-ethylhexyl)phthalate	11	1	1.4	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.15	—	2.1E-08	9.0E-09	8.2E-13	3.1E-08	0.3%	8.9E-04	3.8E-04	3.1E-08	1.3E-03	0.1%
Butyl benzyl phthalate	7	6	0.34	—	2.0E-01	—	2.0E-01	0.15	—	—	—	—	—	—	2.2E-05	9.1E-06	8.3E-10	3.1E-05	0.002%
Chrysene	12	3	0.043	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	3.4E-10	1.4E-10	5.6E-15	4.9E-10	0.01%	2.7E-05	1.2E-05	2.4E-08	3.9E-05	0.003%
Dibenz(a,h)anthracene	12	1	0.029	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	2.3E-07	9.7E-08	3.8E-12	3.3E-07	3%	1.9E-05	7.8E-06	1.7E-08	2.6E-05	0.002%
Indeno(1,2,3-cd)pyrene	12	3	0.11	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	8.8E-08	3.7E-08	1.4E-12	1.2E-07	1%	7.0E-05	3.0E-05	6.3E-08	1.0E-04	0.01%
4,4'-DDT	46	1	0.00675	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	2.5E-09	3.5E-10	9.6E-14	2.9E-09	0.03%	1.7E-04	2.4E-05	6.6E-09	2.0E-04	0.02%
Aroclor 1248	49	1	0.244	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	5.3E-07	2.1E-07	2.0E-11	7.4E-07	8%	1.6E-01	6.1E-02	6.0E-06	2.2E-01	17%
Aroclor 1254	49	1	0.397	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	8.7E-07	3.4E-07	3.3E-11	1.2E-06	13%	2.5E-01	9.9E-02	9.7E-06	3.5E-01	28%
Aroclor 1260	49	1	0.214	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	4.7E-07	1.8E-07	1.8E-11	6.5E-07	7%	1.4E-01	5.4E-02	5.2E-06	1.9E-01	15%
Dieldrin	46	1	0.0126	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	2.2E-07	3.1E-08	8.5E-12	2.5E-07	3%	3.2E-03	4.5E-04	1.2E-07	3.7E-03	0.3%
gamma-Chlordane	45	1	0.00128	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	4.9E-10	6.9E-11	1.9E-14	5.6E-10	0.01%	3.3E-05	4.6E-06	3.1E-09	3.7E-05	0.003%
Aluminum	49	49	—	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	—	—	—	—	—
Antimony	14	3	3.3	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	1.1E-01	3.0E-03	—	1.1E-01	9%
Arsenic	49	43	3.48	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	5.7E-06	4.8E-07	2.2E-09	6.2E-06	65%	1.5E-01	1.2E-02	—	1.6E-01	13%
Barium	49	49	—	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	—	—	—	—	—
Beryllium	49	33	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	49	40	—	—	5.0E-04	6.3E+00	—	0.001	—	—	—	—	—	—	—	—	—	—	—
Chromium	49	49	—	—	—	4.2E+01	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Cobalt	49	47	7.48	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	1.6E-03	4.5E-05	—	1.6E-03	0.1%
Copper	49	49	13.4	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	4.6E-03	1.3E-04	—	4.7E-03	0.4%
Lead	49	49	—	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	49	49	229	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	1.2E-01	3.4E-03	8.0E-03	1.3E-01	11%
Mercury	49	16	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	—	—	—
Nickel	49	47	8.55	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	5.5E-03	1.5E-04	—	5.6E-03	0.5%
Silver	49	13	0.224	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	5.7E-04	1.6E-05	—	5.9E-04	0.05%
Thallium	49	10	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	49	49	31.5	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	5.8E-02	1.6E-03	—	5.9E-02	5%
Zinc	49	49	40.5	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	1.7E-03	4.8E-05	—	1.8E-03	0.1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 9.6E-06					TOTAL HI: 1.24				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:			Dermal Contact with Soil or Sediment:		
Soil ingestion rate (IRs) =	200	mg/d	CF =	1.0E-06	kg/mg
Conversion Factor (CF) =	1.0E-06	kg/mg	Body Surface Area (SA) =	2800	cm ² /event
Fraction Contaminated Soil Ingested =	1	unitless	Soil Adherence Factor (AF) =	0.2	mg/cm ²
Exposure Frequency (EF) =	350	d/yr	EF =	350	d/yr
Exposure Duration (ED) =	6	yr	ED =	6	yr
Body Weight (BW) =	15	kg	BW =	15	kg
Carcinogenic Averaging Time (ATc) =	25550	days	ATc =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	2190	days	ATnc =	2190	days

Inhalation of Dust and VOCs:		
Inhalation Rate (InhR) =	0.42	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg
ATc =	25550	days
ATnc =	2190	days

Notes:

- NA = Not available or not applicable
— = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.
- CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-8: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 8, Units 2 and 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
2-Butanone	4	4	0.004	--	6.0E-01	--	2.9E-01	0.1	1.9E+04	--	--	--	--	--	3.3E-09	4.3E-09	4.7E-08	5.4E-08	0.0004%
Ethylbenzene	4	1	0.002	--	1.0E-01	--	2.9E-01	0.1	4.2E+03	--	--	--	--	--	9.8E-09	1.3E-08	1.1E-07	1.3E-07	0.001%
m,p-Xylene	3	1	0.0025	--	2.0E+00	--	2.0E-01	0.1	4.4E+03	--	--	--	--	--	6.1E-10	8.1E-10	1.9E-07	1.9E-07	0.001%
o-Xylene	3	1	0.00097	--	2.0E+00	--	2.0E-01	0.1	4.4E+03	--	--	--	--	--	2.4E-10	3.1E-10	7.2E-08	7.3E-08	0.0005%
Toluene	9	2	0.008	--	2.0E-01	--	1.1E-01	0.1	3.6E+03	--	--	--	--	--	2.0E-08	2.6E-08	1.3E-06	1.4E-06	0.01%
Xylenes	6	1	0.016	--	2.0E+00	--	2.0E-01	0.1	4.4E+03	--	--	--	--	--	3.9E-09	5.2E-09	1.2E-06	1.2E-06	0.01%
Benzo(b)fluoranthene	5	1	0.0069	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	8.8E-10	1.7E-09	3.8E-14	2.623E-09	0.2%	1.7E-07	3.3E-07	4.0E-10	5.0E-07	0.003%
Benzo(g,h,i)perylene	5	3	0.067	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	1.6E-06	3.2E-06	3.8E-09	4.9E-06	0.03%
Butyl benzyl phthalate	2	2	0.26	--	2.0E-01	--	2.0E-01	0.15	--	--	--	--	--	--	6.4E-07	1.3E-06	6.4E-11	1.9E-06	0.01%
Chrysene	5	1	0.035	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	--	4.5E-11	8.8E-11	1.9E-15	1.33E-10	0.01%	8.6E-07	1.7E-06	2.0E-09	2.6E-06	0.02%
Dibenz(a,h)anthracene	5	1	0.029	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	--	3.7E-08	7.3E-08	1.6E-12	1.102E-07	8%	7.1E-07	1.4E-06	1.7E-09	2.1E-06	0.01%
Indeno(1,2,3-cd)pyrene	5	3	0.11	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	1.4E-08	2.8E-08	6.0E-13	4.181E-08	3%	2.7E-06	5.3E-06	6.3E-09	8.0E-06	0.1%
Aluminum	31	31	--	--	1.0E+00	--	1.4E-03	0.01	--	--	--	--	--	--	--	--	--	--	--
Antimony	3	2	--	--	4.0E-04	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Arsenic	31	27	3.4	1.5E+00	3.0E-04	1.5E+01	--	0.03	--	8.9E-07	3.5E-07	9.0E-10	1.245E-06	89%	5.5E-03	2.2E-03	--	7.7E-03	51%
Barium	31	31	--	--	7.0E-02	--	1.4E-04	0.01	--	--	--	--	--	--	--	--	--	--	--
Beryllium	31	20	--	--	2.0E-03	8.4E+00	5.7E-06	0.01	--	--	--	--	--	--	--	--	--	--	--
Cadmium	31	22	--	--	5.0E-04	6.3E+00	--	0.001	--	--	--	--	--	--	--	--	--	--	--
Chromium	31	31	--	--	--	4.2E+01	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Cobalt	31	29	82.6	--	6.0E-02	--	--	0.01	--	--	--	--	--	--	6.7E-04	8.9E-05	--	7.6E-04	5%
Copper	31	31	17.1	--	3.7E-02	--	--	0.01	--	--	--	--	--	--	2.3E-04	3.0E-05	--	2.5E-04	2%
Lead	31	31	--	--	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Manganese	31	31	227	--	2.4E-02	--	1.4E-05	0.01	--	--	--	--	--	--	4.6E-03	6.1E-04	8.0E-04	6.0E-03	40%
Mercury	31	12	--	--	--	--	8.6E-05	0.01	--	--	--	--	--	--	--	--	--	--	--
Nickel	31	30	8.17	--	2.0E-02	--	--	0.01	--	--	--	--	--	--	2.0E-04	2.6E-05	--	2.3E-04	1%
Silver	31	11	0.252	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	2.5E-05	3.3E-06	--	2.8E-05	0.2%
Thallium	31	6	--	--	6.6E-05	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Vanadium	31	31	--	--	7.0E-03	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Zinc	31	31	42.6	--	3.0E-01	--	--	0.01	--	--	--	--	--	--	6.9E-05	9.2E-06	--	7.9E-05	1%
Cumulative Risk and Cumulative Hazard Index Including Background: ntified in RI Report ^(a) :															1.4E-06	TOTAL HI: 0.02			

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:			Dermal Contact with Soil or Sediment:			Inhalation of Dust and VOCs:		
Soil ingestion rate (IRs) =	50	mg/d	CF =	1.00E-06	kg/mg	Inhalation Rate (InhR) =	0.83	m³/hr
Conversion Factor (CF) =	1.00E-06	kg/mg	Body Surface Area (SA) =	3300	cm²/event	Exposure Time (ET) =	8	hr/day
Fraction Contaminated Soil Ingested =	1	unitless	Soil Adherence Factor (AF) =	0.2	mg/cm²	EF =	250	d/yr
Exposure Frequency (EF) =	250	d/yr	ED =	25	yr	ED =	25	yr
Exposure Duration (ED) =	25	yr	BW =	70	kg	BW =	70	kg
Body Weight (BW) =	70	kg	ATc =	25550	days	Particulate Emission Factor (PEF) =	1.3E+09	m³/kg
Carcinogenic Averaging Time (ATc) =	25550	days	ATnc =	9125	days	ATc =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	9125	days				ATnc =	9125	days

Notes:

- NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.
- CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-9: Summary of Risks and Hazard Indices for Residential Scenario at Site 8, Unit 5

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
1,3-Dichlorobenzene	--	--	--	--	1.5E-05	1.5E-04	1.5E-04	0.03%
2-Hexanone	--	--	--	--	3.4E-07	4.4E-06	4.4E-06	0.001%
Carbon disulfide	--	--	--	--	1.0E-06	8.6E-06	8.6E-06	0.001%
Methylene chloride	7.8E-11	1.9E-10	2.7E-10	0.001%	1.9E-07	2.3E-06	2.3E-06	0.000%
Toluene	--	--	--	--	8.1E-07	6.9E-06	6.9E-06	0.001%
Benzo(b)fluoranthene	3.3E-07	2.4E-06	2.7E-06	6%	6.8E-05	1.9E-03	1.9E-03	0.3%
Benzo(g,h,i)perylene	--	--	--	--	1.9E-04	5.5E-03	5.5E-03	1%
Fluoranthene	--	--	--	--	8.6E-05	2.5E-03	2.5E-03	0.4%
Indeno(1,2,3-cd)pyrene	4.8E-06	3.5E-05	4.0E-05	93%	9.7E-04	2.8E-02	2.8E-02	5%
Phenanthrene	--	--	--	--	9.4E-08	2.7E-06	2.7E-06	0.0004%
4,4'-DDD	9.7E-09	7.5E-08	8.5E-08	0.2%	2.3E-04	7.3E-03	7.3E-03	1%
4,4'-DDE	2.3E-09	1.8E-08	2.0E-08	0.05%	3.9E-05	1.2E-03	1.2E-03	0.2%
4,4'-DDT	1.1E-10	8.7E-10	9.8E-10	0.002%	1.9E-06	5.9E-05	5.9E-05	0.01%
alpha-Chlordane	1.1E-10	8.3E-10	9.4E-10	0.002%	1.8E-06	5.5E-05	5.5E-05	0.01%
Aroclor 1260	1.9E-08	1.4E-07	1.6E-07	0.37%	1.4E-03	4.1E-02	4.1E-02	7%
Endrin	--	--	--	--	4.5E-06	1.4E-04	1.4E-04	0.02%
gamma-Chlordane	1.4E-10	1.0E-09	1.2E-09	0.003%	2.3E-06	7.0E-05	7.0E-05	0.01%
Aluminum	--	--	--	--	6.3E-03	1.9E-01	1.9E-01	31%
Arsenic	--	--	--	--	--	--	--	--
Barium	--	--	--	--	1.2E-03	3.6E-02	3.6E-02	6%
Beryllium	--	--	--	--	--	--	--	--
Cadmium	--	--	--	--	--	--	--	--
Chromium	1.2E-08	2.4E-08	3.6E-08	0.1%	--	--	--	--
Cobalt	--	--	--	--	4.3E-05	1.4E-03	1.4E-03	0.2%
Copper	--	--	--	--	1.2E-04	3.9E-03	3.9E-03	1%
Lead	--	--	--	--	--	--	--	--
Manganese	--	--	--	--	5.7E-03	1.6E-01	1.6E-01	26%
Mercury	--	--	--	--	--	--	--	--
Nickel	--	--	--	--	2.1E-04	6.7E-03	6.7E-03	1%
Selenium	--	--	--	--	1.8E-05	5.8E-04	5.8E-04	0.1%
Silver	--	--	--	--	--	--	--	--
Thallium	--	--	--	--	1.5E-03	4.7E-02	4.7E-02	8%
Vanadium	--	--	--	--	2.3E-03	7.5E-02	7.5E-02	12%
Zinc	--	--	--	--	7.7E-05	2.5E-03	2.5E-03	0.4%
Revised Cumulative Risk and Cumulative Hazard Index:			4.3E-05		0.61			
Revised Cumulative Risk and Cumulative Hazard Index excluding PAHs:			3.0E-07		0.58			

Notes:

^a - ED = Exposure Duration

^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.

^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

Shading indicates additional data was collected during May 1999.

Table C-10: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 8, Unit 5

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
1,3-Dichlorobenzene	2	1	0.0019	—	9.0E-04	—	9.0E-04	0.1	1.2E+04	—	—	—	—	—	8.3E-07	3.3E-07	1.4E-05	1.5E-05	0.08%
2-Hexanone	6	1	0.008	—	6.0E-02	—	5.7E-02	0.1	4.1E+04	—	—	—	—	—	5.2E-08	2.1E-08	2.7E-07	3.4E-07	0.002%
Carbon disulfide	1	1	0.003	—	1.0E-01	—	2.0E-01	0.1	1.2E+03	—	—	—	—	—	1.2E-08	4.7E-09	9.8E-07	1.0E-06	0.005%
Methylene chloride	4	3	0.004	7.5E-03	6.0E-02	1.6E-03	8.6E-01	0.1	2.4E+03	4.0E-12	1.6E-12	7.3E-11	7.8E-11	0.001%	2.6E-08	1.0E-08	1.5E-07	1.9E-07	0.0009%
Toluene	3	3	0.004	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	7.8E-09	3.1E-09	8.0E-07	8.1E-07	0.004%
Benzo(b)fluoranthene	24	1	2.1	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	2.1E-07	1.2E-07	1.3E-11	3.3E-07	6%	4.1E-05	2.5E-05	1.4E-07	6.6E-05	0.3%
Benzo(g,h,i)perylene	24	3	6.1	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	1.2E-04	7.1E-05	4.2E-07	1.9E-04	1%
Fluoranthene	24	2	5.5	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	5.4E-05	3.2E-05	8.1E-09	8.6E-05	0.4%
Indeno(1,2,3-cd)pyrene	24	3	31	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	3.0E-06	1.8E-06	2.0E-10	4.9E-06	93%	6.1E-04	3.6E-04	2.1E-06	9.7E-04	5%
Phenanthrene	18	2	0.003	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	5.9E-08	3.5E-08	2.1E-10	9.4E-08	0.0005%
4,4'-DDD	25	3	0.25	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	8.1E-09	1.6E-09	1.2E-12	9.7E-09	0.2%	2.0E-04	3.9E-05	3.0E-08	2.3E-04	1%
4,4'-DDE	25	3	0.042	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.9E-09	3.8E-10	2.9E-13	2.3E-09	0.04%	3.3E-05	6.6E-06	5.0E-09	3.9E-05	0.2%
4,4'-DDT	25	4	0.00204	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	9.3E-11	1.9E-11	1.4E-14	1.1E-10	0.002%	1.6E-06	3.2E-07	2.4E-10	1.9E-06	0.01%
alpha-Chlordane	21	2	0.0019	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	8.9E-11	1.8E-11	1.4E-14	1.1E-10	0.002%	1.5E-06	3.0E-07	5.6E-10	1.8E-06	0.01%
Aroclor 1260	37	2	0.046	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	1.2E-08	6.9E-09	1.9E-12	1.9E-08	0.4%	9.0E-04	5.0E-04	1.4E-07	1.4E-03	7%
Endrin	21	1	0.0029	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	3.8E-06	7.5E-07	5.7E-10	4.5E-06	0.02%
gamma-Chlordane	21	1	0.0024	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	1.1E-10	2.2E-11	1.7E-14	1.4E-10	0.003%	1.9E-06	3.7E-07	7.1E-10	2.3E-06	0.01%
Aluminum	25	25	14100	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	5.5E-03	2.2E-04	6.0E-04	6.3E-03	31%
Arsenic	25	17	—	1.5E+00	3.0E-04	1.5E+01	—	0.01	—	—	—	—	—	—	1.1E-03	4.2E-05	7.8E-05	1.2E-03	6%
Barium	25	25	189	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	—	—	—	—	—
Beryllium	25	18	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	25	21	—	—	5.0E-04	6.3E+00	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Chromium	25	25	13.8	—	—	4.2E+01	—	0.01	—	—	—	1.2E-08	1.2E-08	0.2%	—	—	—	—	—
Cobalt	25	25	6.41	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	4.2E-05	1.7E-06	—	4.3E-05	0.2%
Copper	25	25	11	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	1.2E-04	4.6E-06	—	1.2E-04	1%
Lead	25	25	—	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	25	25	269	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	4.4E-03	1.8E-04	1.1E-03	5.7E-03	28%
Mercury	24	3	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	—	—	—
Nickel	25	22	10.2	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	2.0E-04	8.0E-06	—	2.1E-04	1%
Selenium	25	5	0.221	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	1.7E-05	6.9E-07	—	1.8E-05	0.1%
Silver	25	3	—	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Thallium	25	7	0.236	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	1.4E-03	5.6E-05	—	1.5E-03	7%
Vanadium	25	25	39.8	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	2.2E-03	8.9E-05	—	2.3E-03	11%
Zinc	25	25	56.8	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	7.4E-05	3.0E-06	—	7.7E-05	0.4%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 5.2E-06					TOTAL HI: 0.02				
Revised Cumulative Risk and Cumulative Hazard Index excluding Indeno(1,2,3-cd)pyrene and Benzo(b)fluoranthene ^(b) :										TOTAL RISK: 4.3E-08					TOTAL HI: 0.02				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:		
Soil ingestion rate (IRs) =	100	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	100	d/yr
Exposure Duration (ED) =	24	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	8760	days

Dermal Contact with Soil or Sediment:

CF =	1.00E-06	kg/mg
Body Surface Area (SA) =	5700	cm ² /event
Soil Adherence Factor (AF) =	0.07	mg/cm ²
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
ATc =	25550	days
ATnc =	8760	days

Inhalation of Dust and VOCs

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	8760	days

Notes:

Shading indicates additional data collected during May 1999.

NA = Not available or not applicable

— = Information not available or not applicable

HI = Hazard index

HQ = Hazard quotient

mg/kg = Milligrams per kilogram

ABS = Dermal absorption factor (unitless)

VF = Soil-to-air volatilization factor (m³/kg)

EPC = Exposure point concentration

^(a) Exposure parameters were updated in addition to toxicity factors.

^(b) Indeno(1,2,3-cd)pyrene and Benzo(b) fluoranthene was reported in 3 out of 6 Phase II RI samples at concentrations of 0.54, 6.1, and 31 mg/kg and 0.038, 0.19, and 2.1 mg/kg respectively following EPA Method 8310. However, those reported concentrations were qualified with a flag indicating uncertainty in the identification of the compound. Subsequent resampling during May 1999 (a total of 18 samples) reported all samples below detection limits. Based on this, Indeno(1,2,3-cd)pyrene was excluded as a chemical of potential concern.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹

CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹

RfDo = Oral reference dose (mg/kg-day)

RfDi = Inhalation reference dose (mg/kg-day)

VOC = Volatile organic chemical

Table C-11: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 8, Unit 5

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
1,3-Dichlorobenzene	2	1	0.0019	--	9.0E-04	--	9.0E-04	0.1	1.2E+04	--	--	--	--	--	2.7E-05	7.6E-06	1.2E-04	1.5E-04	0.03%
2-Hexanone	6	1	0.008	--	6.0E-02	--	5.7E-02	0.1	4.1E+04	--	--	--	--	--	1.7E-06	4.8E-07	2.2E-06	4.4E-06	0.001%
Carbon disulfide	1	1	0.003	--	1.0E-01	--	2.0E-01	0.1	1.2E+03	--	--	--	--	--	3.8E-07	1.1E-07	8.1E-06	8.6E-06	0.001%
Methylene chloride	4	3	0.004	7.5E-03	6.0E-02	1.6E-03	8.6E-01	0.1	2.4E+03	3.3E-11	9.2E-12	1.5E-10	1.9E-10	0.001%	8.5E-07	2.4E-07	1.2E-06	2.3E-06	0.0004%
Toluene	3	3	0.004	--	2.0E-01	--	1.1E-01	0.1	3.6E+03	--	--	--	--	--	2.6E-07	7.2E-08	6.6E-06	6.9E-06	0.001%
Benzo(b)fluoranthene	24	1	2.1	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	1.7E-06	7.1E-07	2.7E-11	2.4E-06	6%	1.3E-03	5.6E-04	1.2E-06	1.9E-03	0.3%
Benzo(g,h,i)perylene	24	3	6.1	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	3.9E-03	1.6E-03	3.5E-08	5.5E-03	1%
Fluoranthene	24	2	5.5	--	4.0E-02	--	4.0E-02	0.15	--	--	--	--	--	--	1.8E-03	7.4E-04	6.7E-08	2.5E-03	0.4%
Indeno(1,2,3-cd)pyrene	24	3	31	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	2.5E-05	1.0E-05	4.0E-10	3.5E-05	93%	2.0E-02	8.3E-03	1.8E-05	2.8E-02	5%
Phenanthrene	18	2	0.003	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	1.9E-06	8.1E-07	1.7E-09	2.7E-06	0.0004%
4,4'-DDD	25	3	0.25	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	6.6E-08	9.2E-09	2.5E-12	7.5E-08	0.2%	6.4E-03	8.9E-04	2.4E-07	7.3E-03	1%
4,4'-DDE	25	3	0.042	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	1.6E-08	2.2E-09	6.0E-13	1.8E-08	0.05%	1.1E-03	1.5E-04	4.1E-08	1.2E-03	0.2%
4,4'-DDT	25	4	0.00204	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	7.6E-10	1.1E-10	2.9E-14	8.7E-10	0.002%	5.2E-05	7.3E-06	2.0E-09	5.9E-05	0.01%
alpha-Chlordane	21	2	0.0019	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	7.3E-10	1.0E-10	2.8E-14	8.3E-10	0.002%	4.9E-05	6.8E-06	4.7E-09	5.5E-05	0.01%
Aroclor 1260	37	2	0.046	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	1.0E-07	4.0E-08	3.9E-12	1.4E-07	0.4%	2.9E-02	1.2E-02	1.1E-06	4.1E-02	7%
Endrin	21	1	0.0029	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	1.2E-04	1.7E-05	4.7E-09	1.4E-04	0.02%
gamma-Chlordane	21	1	0.0024	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	9.2E-10	1.3E-10	3.5E-14	1.0E-09	0.003%	6.1E-05	8.6E-06	5.9E-09	7.0E-05	0.01%
Aluminum	25	25	14100	--	1.0E+00	--	1.4E-03	0.01	--	--	--	--	--	--	1.8E-01	5.0E-03	4.9E-03	1.9E-01	31%
Arsenic	25	17	--	1.5E+00	3.0E-04	1.5E+01	--	0.01	--	--	--	--	--	--	3.5E-02	9.7E-04	6.5E-04	3.6E-02	6%
Barium	25	25	189	--	7.0E-02	--	1.4E-04	0.01	--	--	--	--	--	--	--	--	--	--	--
Beryllium	25	18	--	--	2.0E-03	8.4E+00	5.7E-06	0.01	--	--	--	--	--	--	--	--	--	--	--
Cadmium	25	21	--	--	5.0E-04	6.3E+00	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Chromium	25	25	13.8	--	--	4.2E+01	--	0.01	--	--	--	2.4E-08	2.4E-08	0.06%	--	--	--	--	--
Cobalt	25	25	6.41	--	6.0E-02	--	--	0.01	--	--	--	--	--	--	1.4E-03	3.8E-05	--	1.4E-03	0.2%
Copper	25	25	11	--	3.7E-02	--	--	0.01	--	--	--	--	--	--	3.8E-03	1.1E-04	--	3.9E-03	1%
Lead	25	25	--	--	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Manganese	25	25	269	--	2.4E-02	--	1.4E-05	0.01	--	--	--	--	--	--	1.4E-01	4.0E-03	9.4E-03	1.6E-01	26%
Mercury	24	3	--	--	--	--	8.6E-05	0.01	--	--	--	--	--	--	--	--	--	--	--
Nickel	25	22	10.2	--	2.0E-02	--	--	0.01	--	--	--	--	--	--	6.5E-03	1.8E-04	--	6.7E-03	1%
Selenium	25	5	0.221	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	5.7E-04	1.6E-05	--	5.8E-04	0.1%
Silver	25	3	--	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Thallium	25	7	0.236	--	6.6E-05	--	--	0.01	--	--	--	--	--	--	4.6E-02	1.3E-03	--	4.7E-02	8%
Vanadium	25	25	39.8	--	7.0E-03	--	--	0.01	--	--	--	--	--	--	7.3E-02	2.0E-03	--	7.5E-02	12%
Zinc	25	25	56.8	--	3.0E-01	--	--	0.01	--	--	--	--	--	--	2.4E-03	6.8E-05	--	2.5E-03	0.4%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK:		3.8E-05		TOTAL HI:		0.61			
Revised Cumulative Risk and Cumulative Hazard Index excluding Indeno(1,2,3-cd)pyrene and Benzo(b)fluoranthene ^(a) :										TOTAL RISK:		2.6E-07		TOTAL HI:		0.61			

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:			Dermal Contact with Soil or Sediment:			Inhalation of Dust and VOCs		
Soil ingestion rate (IRs) =	200	mg/d	CF =	1.00E-06	kg/mg	Inhalation Rate (InhR) =	0.42	m ³ /hr
Conversion Factor (CF) =	1.00E-06	kg/mg	Body Surface Area (SA) =	2800	cm ² /event	Exposure Time (ET) =	24	hr/day
Fraction Contaminated Soil Ingested =	1	unitless	Soil Adherence Factor (AF) =	0.2	mg/cm ²	EF =	350	d/yr
Exposure Frequency (EF) =	350	d/yr	ED =	350	d/yr	ED =	6	yr
Exposure Duration (ED) =	6	yr	BW =	15	kg	BW =	15	kg
Body Weight (BW) =	15	kg	ATc =	25550	days	Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
Carcinogenic Averaging Time (ATc) =	25550	days	ATnc =	2190	days	ATc =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	2190	days				ATnc =	2190	days

Notes:

Shading indicates additional data was collected during May 1999.

NA = Not available or not applicable

-- = Information not available or not applicable

HI = Hazard index

HQ = Hazard quotient

mg/kg = Milligrams per kilogram

ABS = Dermal absorption factor (unitless)

VF = Soil-to-air volatilization factor (m³/kg)

EPC = Exposure point concentration

^(a) Exposure parameters were updated in addition to toxicity factors

^(b) Indeno(1,2,3-cd)pyrene and Benzo(b) fluoranthene was reported in 3 out of 6 Phase II RI samples at concentrations of 0.54, 6.1, and 31 mg/kg and 0.038, 0.19, and 2.1 mg/kg respectively following EPA Method 8310. However, those reported concentrations were qualified with a flag indicating uncertainty in the identification of the compound. Subsequent resampling during May 1999 (a total of 18 samples) reported all samples below detection limits. Based on this, Indeno(1,2,3-cd)pyrene was excluded as a chemical of potential concern.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹

CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹

RfDo = Oral reference dose (mg/kg-day)

RfDi = Inhalation reference dose (mg/kg-day)

VOC = Volatile organic chemical

Table C-12: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 8, Unit 5

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
Benzo(b)fluoranthene	10	1	2.1	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	2.7E-07	5.3E-07	1.1E-11	8.0E-07	6%	5.1E-05	1.0E-04	1.2E-07	1.5E-04	1%
Benzo(g,h,i)perylene	10	2	6.1	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	1.5E-04	3.0E-04	3.5E-07	4.5E-04	2%
Fluoranthene	10	1	5.5	--	4.0E-02	--	4.0E-02	0.15	--	--	--	--	--	--	6.7E-05	1.3E-04	6.8E-09	2.0E-04	1%
Indeno(1,2,3-cd)pyrene	10	2	31	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	4.0E-06	7.8E-06	1.7E-10	1.178E-05	86%	7.8E-04	1.5E-03	1.8E-06	2.3E-03	10%
Phenanthrene	8	2	0.003	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	7.3E-08	1.5E-07	1.7E-10	2.2E-07	0.001%
4,4'-DDD	12	3	0.25	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	1.0E-08	6.9E-09	1.1E-12	1.7E-08	0.1%	2.4E-04	1.6E-04	2.5E-08	4.1E-04	2%
4,4'-DDE	12	3	0.042	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	2.5E-09	1.6E-09	2.5E-13	4.1E-09	0.03%	4.1E-05	2.7E-05	4.1E-09	6.8E-05	0.3%
4,4'-DDT	12	4	0.025	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	1.5E-09	9.8E-10	1.5E-13	2.5E-09	0.02%	2.4E-05	1.6E-05	2.5E-09	4.1E-05	0.2%
alpha-Chlordane	8	2	0.0019	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	1.2E-10	7.7E-11	1.2E-14	1.9E-10	0.001%	1.9E-06	1.2E-06	4.7E-10	3.1E-06	0.0%
Aroclor 1260	15	1	0.008	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	2.8E-09	5.2E-09	2.8E-13	8.0E-09	0.1%	2.0E-04	3.6E-04	2.0E-08	5.6E-04	2%
Endrin	8	1	0.0029	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	4.7E-06	3.1E-06	4.8E-10	7.9E-06	0.03%
gamma-Chlordane	8	1	0.0024	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	1.5E-10	9.7E-11	1.5E-14	2.4E-10	0.002%	2.3E-06	1.5E-06	5.9E-10	3.9E-06	0.02%
Aluminum	12	12	--	--	1.0E+00	--	1.4E-03	0.01	--	--	--	--	--	--	6.2E-03	8.2E-04	--	7.0E-03	30%
Arsenic	12	9	3.81	1.5E+00	3.0E-04	1.5E+01	--	0.01	--	1.0E-06	1.3E-07	1.0E-09	1.131E-06	8%	--	--	--	--	--
Barium	12	12	--	--	7.0E-02	--	1.4E-04	0.01	--	--	--	--	--	--	--	--	--	--	--
Beryllium	12	12	--	--	2.0E-03	8.4E+00	5.7E-06	0.01	--	--	--	--	--	--	--	--	--	--	--
Cadmium	12	9	--	--	5.0E-04	6.3E+00	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Chromium	12	12	--	--	--	4.2E+01	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Cobalt	12	12	7.8	--	6.0E-02	--	--	0.01	--	--	--	--	--	--	6.4E-05	8.4E-06	--	7.2E-05	0.3%
Copper	12	12	13	--	3.7E-02	--	--	0.01	--	--	--	--	--	--	1.7E-04	2.3E-05	--	1.9E-04	1%
Lead	12	12	5	--	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Manganese	12	12	299	--	2.4E-02	--	1.4E-05	0.01	--	--	--	--	--	--	6.1E-03	8.0E-04	1.1E-03	8.0E-03	34%
Mercury	12	2	--	--	--	--	8.6E-05	0.01	--	--	--	--	--	--	--	--	--	--	--
Nickel	12	12	13.5	--	2.0E-02	--	--	0.01	--	--	--	--	--	--	3.3E-04	4.4E-05	--	3.7E-04	2%
Selenium	12	3	0.58	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	5.7E-05	7.5E-06	--	6.4E-05	0.3%
Silver	12	1	5	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	4.9E-04	6.5E-05	--	5.5E-04	2%
Thallium	12	2	--	--	6.6E-05	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Vanadium	12	12	38.3	--	7.0E-03	--	--	0.01	--	--	--	--	--	--	2.7E-03	3.5E-04	--	3.0E-03	13%
	12	12	81	--	3.0E-01	--	--	0.01	--	--	--	--	--	--	1.3E-04	1.7E-05	--	1.5E-04	1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 1.4E-05					TOTAL HI: 0.02				
Revised Cumulative Risk and Cumulative Hazard Index excluding Indeno(1,2,3-cd)pyrene and Benzo(b)fluoranthene ^(a) :										TOTAL RISK: 1.2E-06					TOTAL HI: 0.02				

Exposure Parameters:

<u>Incidental Ingestion of Soil or Sediment:</u>			<u>Dermal Contact with Soil or Sediment:</u>			<u>Inhalation of Dust and VOCs</u>			
Soil ingestion rate (IRs) =	50	mg/d	CF =	1.00E-06	kg/mg	IRa =	0.83	m ³ /hr	
Conversion Factor (CF) =	1.00E-06	kg/mg	Body Surface Area (SA) =	3300	cm ² /event	ET =	8	hr/day	
Fraction Contaminated Soil Ingested =	1	unitless	Soil Adherence Factor (AF) =	0.2	mg/cm ²	EF =	250	d/yr	
Exposure Frequency (EF) =	250	d/yr		EF =	250	d/yr	ED =	25	yr
Exposure Duration (ED) =	25	yr		ED =	25	yr	BW =	70	kg
Body Weight (BW) =	70	kg		BW =	70	kg	PEF =	1.3E+09	m ³ /kg
Carcinogenic Averaging Time (ATc)	25550	days		ATc =	25550	days	ATc =	25550	days
Noncarcinogenic Averaging Time (ATnc)	9125	days		ATnc =	9125	days	ATnc =	9125	days

Notes:

Shading indicates additional data was collected during May 1999.
NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors
^(b) Indeno(1,2,3-cd)pyrene and Benzo(b) fluoranthene was reported in 3 out of 6 Phase II RI samples at concentrations of 0.54, 6.1, and 31 mg/kg and 0.038, 0.19, and 2.1 mg/kg respectively following EPA Method 8310. However, those reported concentrations were qualified with a flag indicating uncertainty in the identification of the compound. Subsequent resampling during May 1999 (a total of 18 samples) reported all samples below detection limits. Based on this, Indeno(1,2,3-cd)pyrene was excluded as a chemical of potential concern.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-13: Summary of Risks and Hazard Indices for Residential Scenario at Site 11, Unit 1

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
4,4'-DDD	3.8E-10	3.0E-09	3.3E-09	0.03%	9.3E-06	2.9E-04	2.9E-04	0.01%
4,4'-DDE	2.1E-10	1.6E-09	1.8E-09	0.02%	3.5E-06	1.1E-04	1.1E-04	0.004%
4,4'-DDT	3.7E-10	2.8E-09	3.2E-09	0.03%	6.3E-06	2.0E-04	2.0E-04	0.01%
alpha-Chlordane	6.8E-11	5.2E-10	5.9E-10	0.01%	1.1E-06	3.5E-05	3.5E-05	0.001%
Aroclor 1260	1.2E-06	8.5E-06	9.7E-06	99%	8.5E-02	2.5E+00	2.5E+00	100%
beta-BHC	7.0E-10	5.4E-09	6.1E-09	0.1%	8.7E-10	2.7E-08	2.7E-08	0.000001%
Endosulfan II	--	--	--	--	2.8E-07	8.6E-06	8.6E-06	0.0003%
Endrin aldehyde	--	--	--	--	3.3E-06	1.0E-04	1.0E-04	0.004%
Heptachlor	4.4E-09	3.4E-08	3.9E-08	0.4%	5.7E-06	1.8E-04	1.8E-04	0.01%
Revised Cumulative Risk and Cumulative Hazard Index:				9.8E-06	2.49			

Notes:

^a - ED = Exposure Duration

^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.

^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

Table C-14: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 11, Unit 1

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	19	6	0.00989	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	3.2E-10	6.4E-11	4.8E-14	3.8E-10	0.03%	7.7E-06	1.5E-06	1.2E-09	9.3E-06	0.01%
4,4'-DDE	19	5	0.00376	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	1.7E-10	3.4E-11	2.6E-14	2.1E-10	0.02%	2.9E-06	5.9E-07	4.5E-10	3.5E-06	0.00%
4,4'-DDT	17	3	0.0067	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	3.1E-10	6.1E-11	4.6E-14	3.7E-10	0.03%	5.2E-06	1.0E-06	7.9E-10	6.3E-06	0.01%
alpha-Chlordane	17	1	0.0012	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	5.6E-11	1.1E-11	8.5E-15	6.8E-11	0.01%	9.4E-07	1.9E-07	3.6E-10	1.1E-06	0.001%
Aroclor 1260	19	3	2.8	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	7.5E-07	4.2E-07	1.1E-10	1.2E-06	99%	5.5E-02	3.1E-02	8.3E-06	8.5E-02	100%
beta-BHC	17	2	0.0024	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.05	--	5.8E-10	1.2E-10	8.8E-14	7.0E-10	0.1%	7.2E-10	1.4E-10	1.1E-13	8.7E-10	0.000001%
Endosulfan II	19	4	0.00355	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	2.3E-07	4.6E-08	3.5E-11	2.8E-07	0.0003%
Endrin aldehyde	19	4	0.0021	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	2.7E-06	5.5E-07	4.1E-10	3.3E-06	0.004%
Heptachlor	17	2	0.0061	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	--	3.7E-09	7.3E-10	5.6E-13	4.4E-09	0.4%	4.8E-06	9.5E-07	7.2E-10	5.7E-06	0.01%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK:		1.2E-06		TOTAL HI: 0.08544					

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:			Dermal Contact with Soil or Sediment:			Inhalation of Dust and VOCs:		
Soil ingestion rate (IRs) =	100	mg/d	CF =	1.0E-06	kg/mg	Inhalation Rate (InhR) =	0.83	m³/hr
Conversion Factor (CF) =	1.00E-06	kg/mg	Body Surface Area (SA) =	5700	cm²/event	Exposure Time (ET) =	24	hr/day
Fraction Contaminated Soil Ingested =	1	unitless	Soil Adherence Factor (AF) =	0.07	mg/cm²	EF =	100	d/yr
Exposure Frequency (EF) =	100	d/yr	EF =	100	d/yr	ED =	24	yr
Exposure Duration (ED) =	24	yr	ED =	24	yr	BW =	70	kg
Body Weight (BW) =	70	kg	BW =	70	kg	Particulate Emission Factor (PEF) =	1.32E+09	m³/kg
Carcinogenic Averaging Time (ATc) =	25550	days	ATc =	25550	days	ATc =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	8760	days	ATnc =	8760	days	ATnc =	8760	days

Notes:

- NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.
- CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-15: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 11, Unit 1

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	19	6	0.00989	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	2.6E-09	3.6E-10	1.0E-13	3.0E-09	0.03%	2.5E-04	3.5E-05	9.7E-09	2.9E-04	0.01%
4,4'-DDE	19	5	0.00376	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	1.4E-09	2.0E-10	5.4E-14	1.6E-09	0.02%	9.6E-05	1.3E-05	3.7E-09	1.1E-04	0.004%
4,4'-DDT	17	3	0.0067	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	2.5E-09	3.5E-10	9.5E-14	2.8E-09	0.03%	1.7E-04	2.4E-05	6.6E-09	2.0E-04	0.01%
alpha-Chlordane	17	1	0.0012	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	4.6E-10	6.4E-11	1.8E-14	5.2E-10	0.01%	3.1E-05	4.3E-06	2.9E-09	3.5E-05	0.001%
Aroclor 1260	19	3	2.8	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	6.1E-06	2.4E-06	2.4E-10	8.5E-06	99%	1.8E+00	7.0E-01	6.9E-05	2.5E+00	100%
beta-BHC	17	2	0.0024	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.05	--	4.7E-09	6.6E-10	1.8E-13	5.4E-09	0.1%	2.4E-08	3.3E-09	9.0E-13	2.7E-08	0.000001%
Endosulfan II	19	4	0.00355	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	7.6E-06	1.1E-06	2.9E-10	8.6E-06	0.0003%
Endrin aldehyde	19	4	0.0021	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	8.9E-05	1.3E-05	3.4E-09	1.0E-04	0.004%
Heptachlor	17	2	0.0061	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	--	3.0E-08	4.2E-09	1.2E-12	3.4E-08	0.4%	1.6E-04	2.2E-05	6.0E-09	1.8E-04	0.01%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :														TOTAL RISK: 8.6E-06	TOTAL HI: 2.4926				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:			Dermal Contact with Soil or Sediment:			Inhalation of Dust and VOCs:		
Soil ingestion rate (IRs) =	200	mg/d	CF =	1.0E-06	kg/mg	Inhalation Rate (InhR) =	0.42	m ³ /hr
Conversion Factor (CF) =	1.00E-06	kg/mg	Body Surface Area (SA) =	2800	cm ² /event	Exposure Time (ET) =	24	hr/day
Fraction Contaminated Soil Ingested =	1	unitless	Soil Adherence Factor (AF) =	0.2	mg/cm ²	EF =	350	d/yr
Exposure Frequency (EF) =	350	d/yr	ED =	350	d/yr	ED =	6	yr
Exposure Duration (ED) =	6	yr	ED =	6	yr	BW =	15	kg
Body Weight (BW) =	15	kg	BW =	15	kg	Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
Carcinogenic Averaging Time (ATc) =	25550	days	ATc =	25550	days	ATc =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	2190	days	ATnc =	2190	days	ATnc =	2190	days

Notes:

- NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.
- CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-16: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 11, Unit 1

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	12	6	0.1	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	4.2E-09	2.8E-09	4.2E-13	7.0E-09	0.2%	9.8E-05	6.5E-05	9.9E-09	1.6E-04	0.1%
4,4'-DDE	12	5	0.015	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	8.9E-10	5.9E-10	9.0E-14	1.5E-09	0.1%	1.5E-05	9.7E-06	1.5E-09	2.4E-05	0.01%
4,4'-DDT	10	3	0.0067	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	4.0E-10	2.6E-10	4.0E-14	6.6E-10	0.02%	6.6E-06	4.3E-06	6.6E-10	1.1E-05	0.01%
alpha-Chlordane	10	1	0.0012	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	7.3E-11	4.8E-11	7.4E-15	1.2E-10	0.004%	1.2E-06	7.7E-07	3.0E-10	1.9E-06	0.001%
Aroclor 1260	12	3	2.8	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	9.8E-07	1.8E-06	9.9E-11	2.8E-06	100%	6.8E-02	1.3E-01	6.9E-06	2.0E-01	100%
Endosulfan II	12	2	0.0679	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	5.5E-06	3.7E-06	5.6E-10	9.2E-06	0.005%
Endrin aldehyde	12	4	0.00648	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	1.1E-05	7.0E-06	1.1E-09	1.8E-05	0.01%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 2.8E-06				TOTAL HI: 0.20					

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	50	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	250	d/yr
Exposure Duration (ED) =	25	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc)	25550	days
Noncarcinogenic Averaging Time (ATnc)	9125	days

Dermal Contact with Soil or Sediment:

CF =	1.00E-06	kg/mg
Body Surface Area (SA) =	3300	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
ATc =	25550	days
ATnc =	9125	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	8	hr/day
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg
ATc =	25550	days
ATnc =	9125	days

Notes:

- NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.
- CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-17: Summary of Risks and Hazard Indices for Residential Scenario at Site 11, Unit 2

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
4,4'-DDD	5.3E-10	4.1E-09	4.6E-09	0.1%	1.3E-05	4.0E-04	4.0E-04	0.04%
4,4'-DDE	3.3E-10	2.6E-09	2.9E-09	0.1%	5.7E-06	1.8E-04	1.8E-04	0.02%
4,4'-DDT	1.1E-09	8.5E-09	9.6E-09	0.2%	1.9E-05	5.8E-04	5.8E-04	0.1%
alpha-Chlordane	1.8E-10	1.4E-09	1.6E-09	0.03%	3.0E-06	9.3E-05	9.3E-05	0.01%
Aroclor 1260	5.0E-07	3.7E-06	4.2E-06	91%	3.7E-02	1.1E+00	1.1E+00	99%
beta-BHC	6.4E-10	5.0E-09	5.6E-09	0.1%	8.0E-10	2.5E-08	2.5E-08	0.000002%
Dieldrin	3.9E-08	3.0E-07	3.4E-07	7%	1.4E-04	4.4E-03	4.4E-03	0.4%
Endosulfan II	--	--	--	--	8.4E-07	2.6E-05	2.6E-05	0.002%
Endosulfan sulfate	--	--	--	--	7.3E-06	2.3E-04	2.3E-04	0.02%
Endrin	--	--	--	--	3.9E-05	1.2E-03	1.2E-03	0.1%
Endrin aldehyde	--	--	--	--	2.8E-05	8.7E-04	8.7E-04	0.1%
gamma-BHC (Lindane)	2.7E-10	2.1E-09	2.4E-09	0.1%	2.0E-06	6.3E-05	6.3E-05	0.01%
gamma-Chlordane	1.9E-10	1.5E-09	1.7E-09	0.04%	3.2E-06	9.9E-05	9.9E-05	0.01%
Heptachlor	3.4E-09	2.7E-08	3.0E-08	1%	4.5E-06	1.4E-04	1.4E-04	0.01%
Methoxychlor	--	--	--	--	7.5E-06	2.3E-04	2.3E-04	0.02%
Revised Cumulative Risk and Cumulative Hazard Index:			4.6E-06				1.08	

Notes:

^a - ED = Exposure Duration

^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.

^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

All analytes had additional data collected during May 1999.

Table C-18: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 11, Unit 2

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	29	5	0.0136	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	4.4E-10	8.8E-11	6.6E-14	5.3E-10	0%	1.1E-05	2.1E-06	1.6E-09	1.3E-05	0.03%
4,4'-DDE	20	6	0.006	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	2.7E-10	5.5E-11	4.2E-14	3.3E-10	0%	4.7E-06	9.4E-07	7.1E-10	5.7E-06	0.02%
4,4'-DDT	29	10	0.020	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	9.1E-10	1.8E-10	1.4E-13	1.1E-09	0%	1.6E-05	3.1E-06	2.4E-09	1.9E-05	0.05%
alpha-Chlordane	20	1	0.0032	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	1.5E-10	3.0E-11	2.3E-14	1.8E-10	0%	2.5E-06	5.0E-07	9.5E-10	3.0E-06	0.01%
Aroclor 1260	29	8	1.2	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	3.2E-07	1.8E-07	4.9E-11	5.0E-07	92%	2.3E-02	1.3E-02	3.6E-06	3.7E-02	99%
beta-BHC	20	5	0.002	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.05	—	5.4E-10	1.1E-10	8.1E-14	6.4E-10	0%	6.7E-10	1.3E-10	1.0E-13	8.0E-10	0.000002%
Dieldrin	4	1	0.015	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	3.2E-08	6.4E-09	4.9E-12	3.9E-08	7%	1.2E-04	2.3E-05	1.8E-08	1.4E-04	0.4%
Endosulfan II	29	6	0.011	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	7.0E-07	1.4E-07	1.1E-10	8.4E-07	0.002%
Endosulfan sulfate	4	2	0.093	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	6.1E-06	1.2E-06	9.2E-10	7.3E-06	0.02%
Endrin	13	1	0.0249	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	3.2E-05	6.5E-06	4.9E-09	3.9E-05	0.1%
Endrin aldehyde	29	6	0.0178	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	2.3E-05	4.6E-06	3.5E-09	2.8E-05	0.1%
gamma-BHC (Lindane)	20	2	0.0013	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	—	2.3E-10	4.5E-11	3.4E-14	2.7E-10	0%	1.7E-06	3.4E-07	2.6E-10	2.0E-06	0.01%
gamma-Chlordane	20	2	0.0034	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	1.6E-10	3.2E-11	2.4E-14	1.9E-10	0%	2.7E-06	5.3E-07	1.0E-09	3.2E-06	0.01%
Heptachlor	20	8	0.0048	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	—	2.9E-09	5.7E-10	4.4E-13	3.4E-09	1%	3.7E-06	7.4E-07	5.6E-10	4.5E-06	0.01%
Methoxychlor	4	2	0.0800	—	5.0E-03	—	5.0E-03	0.05	—	—	—	—	—	—	6.3E-06	1.2E-06	9.5E-10	7.5E-06	0.02%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK:		5.5E-07		TOTAL HI:		0.037			

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:		
Soil ingestion rate (IRs) =	100	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	100	d/yr
Exposure Duration (ED) =	24	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	8760	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	5700	cm ² /event
Soil Adherence Factor (AF) =	0.07	mg/cm ²
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
ATc =	25550	days
ATnc =	8760	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr	m ³ /hr
Exposure Time (ET) =	24	hr/day	hr/day
EF =	100	d/yr	d/yr
ED =	24	yr	yr
BW =	70	kg	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg	m ³ /kg
ATc =	25550	days	days
ATnc =	8760	days	days

Notes:

All Analytes had additional data collected during May 1999.

NA = Not available or not applicable

— = Information not available or not applicable

HI = Hazard index

HQ = Hazard quotient

mg/kg = Milligrams per kilogram

ABS = Dermal absorption factor (unitless)

VF = Soil-to-air volatilization factor (m³/kg)

EPC = Exposure point concentration

^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹

CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹

RfDo = Oral reference dose (mg/kg-day)

RfDi = Inhalation reference dose (mg/kg-day)

VOC = Volatile organic chemical

Dermal Contact with Soil or Sediment:

Table C-19: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 11, Unit 2

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	29	5	0.0136	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	3.6E-09	5.0E-10	1.4E-13	4.1E-09	0.1%	3.5E-04	4.9E-05	1.3E-08	4.0E-04	0.04%
4,4'-DDE	20	6	0.006	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	2.2E-09	3.1E-10	8.6E-14	2.6E-09	0.1%	1.5E-04	2.2E-05	5.9E-09	1.8E-04	0.02%
4,4'-DDT	29	10	0.020	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	7.5E-09	1.0E-09	2.8E-13	8.5E-09	0.2%	5.1E-04	7.2E-05	2.0E-08	5.8E-04	0.1%
alpha-Chlordane	20	1	0.0032	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	1.2E-09	1.7E-10	4.7E-14	1.4E-09	0.03%	8.2E-05	1.1E-05	7.8E-09	9.3E-05	0.01%
Aroclor 1260	29	8	1.2	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	2.6E-06	1.0E-06	1.0E-10	3.7E-06	91%	7.7E-01	3.0E-01	2.9E-05	1.1E+00	99%
beta-BHC	20	5	0.002	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.05	--	4.4E-09	6.1E-10	1.7E-13	5.0E-09	0.1%	2.2E-08	3.1E-09	8.4E-13	2.5E-08	0.000002%
Dieldrin	4	4	0.015	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	--	2.6E-07	3.7E-08	1.0E-11	3.0E-07	7%	3.8E-03	5.4E-04	1.5E-07	4.4E-03	0.4%
Endosulfan II	29	6	0.011	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	2.3E-05	3.2E-06	8.7E-10	2.6E-05	0.00%
Endosulfan sulfate	29	6	0.011	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	2.0E-04	2.8E-05	7.6E-09	2.3E-04	0.02%
Endrin	4	2	0.093	--	--	--	--	0.05	--	--	--	--	--	--	1.1E-03	1.5E-04	4.1E-08	1.2E-03	0.1%
Endrin aldehyde	13	1	0.0249	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	7.6E-04	1.1E-04	2.9E-08	8.7E-04	0.08%
gamma-BHC (Lindane)	29	6	0.0178	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	5.5E-05	7.8E-06	2.1E-09	6.3E-05	0.01%
gamma-Chlordane	20	2	0.0013	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	--	1.9E-09	2.6E-10	7.1E-14	2.1E-09	0.1%	8.7E-05	1.2E-05	8.3E-09	9.9E-05	0.01%
Heptachlor	20	2	0.0034	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	1.3E-09	1.8E-10	5.0E-14	1.5E-09	0.04%	1.2E-04	1.7E-05	4.7E-09	1.4E-04	0.01%
Methoxychlor	20	8	0.0048	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	--	2.3E-08	3.3E-09	9.1E-13	2.7E-08	1%	2.0E-04	2.9E-05	7.8E-09	2.3E-04	0.02%
	4	2	0.0800	--	5.0E-03	--	5.0E-03	0.05	--	--	--	--	--	--	2.0E-04	2.9E-05	7.8E-09	2.3E-04	0.02%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 4.0E-06					TOTAL HI: 1.076				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:		
Soil ingestion rate (IRs) =	200	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	350	d/yr
Exposure Duration (ED) =	6	yr
Body Weight (BW) =	15	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	2190	days

Dermal Contact with Soil or Sediment:

Dermal Contact with Soil or Sediment:		
CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	2800	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
ATc =	25550	days
ATnc =	2190	days

Inhalation of Dust and VOCs:		
Inhalation Rate (InhR) =	0.42	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	2190	days

Notes:

All Analytes had additional data collected During May 1999.

NA = Not available or not applicable

-- = Information not available or not applicable

HI = Hazard index

HQ = Hazard quotient

mg/kg = Milligrams per kilogram

ABS = Dermal absorption factor (unitless)

VF = Soil-to-air volatilization factor (m³/kg)

EPC = Exposure point concentration

^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹

CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹

RfDo = Oral reference dose (mg/kg-day)

RfDi = Inhalation reference dose (mg/kg-day)

VOC = Volatile organic chemical

Table C-20: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 11, Unit 2

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	12	2	0.0033	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	1.4E-10	9.1E-11	1.4E-14	2.3E-10	0.1%	3.2E-06	2.1E-06	3.3E-10	5.4E-06	0.1%
4,4'-DDE	6	2	0.0096	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	5.7E-10	3.8E-10	5.8E-14	9.5E-10	0.5%	9.4E-06	6.2E-06	9.5E-10	1.6E-05	0.2%
4,4'-DDT	12	5	0.030	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	1.8E-09	1.2E-09	1.8E-13	2.9E-09	2%	2.9E-05	1.9E-05	2.9E-09	4.8E-05	1%
Aroclor 1260	12	5	0.11	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	3.8E-08	7.0E-08	3.8E-12	1.1E-07	57%	2.7E-03	4.9E-03	2.7E-07	7.6E-03	91%
Dieldrin	2	1	0.015	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	--	4.2E-08	2.8E-08	4.3E-12	7.0E-08	36%	1.5E-04	9.7E-05	1.5E-08	2.4E-04	3%
Endosulfan II	12	3	0.052	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	4.2E-06	2.8E-06	4.2E-10	7.0E-06	0.1%
Endosulfan sulfate	2	1	0.093	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	7.6E-06	5.0E-06	7.7E-10	1.3E-05	0.2%
Endrin aldehyde	12	4	0.13	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	2.1E-04	1.4E-04	2.1E-08	3.5E-04	4%
Heptachlor	6	2	0.0069	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	--	5.4E-09	3.6E-09	5.5E-13	9.0E-09	5%	6.8E-06	4.5E-06	6.8E-10	1.1E-05	0.1%
Methoxychlor	2	1	0.08	--	5.0E-03	--	5.0E-03	0.05	--	--	--	--	--	--	7.8E-06	5.2E-06	7.9E-10	1.3E-05	0.2%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK:		1.9E-07		TOTAL HI:		0.0083			

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:			Dermal Contact with Soil or Sediment:			Inhalation of Dust and VOCs:		
Soil ingestion rate (IRs) =	50	mg/d	CF =	1.00E-06	kg/mg	Inhalation Rate (InhR) =	0.83	m³/hr
Conversion Factor (CF) =	1.00E-06	kg/mg	Body Surface Area (SA) =	3300	cm²/event	Exposure Time (ET) =	8	hr/day
Fraction Contaminated Soil Ingested =	1	unitless	Soil Adherence Factor (AF) =	0.2	mg/cm²	EF =	250	d/yr
Exposure Frequency (EF) =	250	d/yr	EF =	250	d/yr	ED =	25	yr
Exposure Duration (ED) =	25	yr	ED =	25	yr	BW =	70	kg
Body Weight (BW) =	70	kg	BW =	70	kg	Particulate Emission Factor (PEF) =	1.3E+09	m³/kg
Carcinogenic Averaging Time (ATc) =	25550	days	ATc =	25550	days	ATc =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	9125	days	ATnc =	9125	days	ATnc =	9125	days

Dermal Contact with Soil or Sediment:

Notes:

- All Analytes had additional data collected During May 1999.
- NA = Not available or not applicable
- = Information not available or not applicable
- HI = Hazard index
- HQ = Hazard quotient
- mg/kg = Milligrams per kilogram
- ABS = Dermal absorption factor (unitless)
- VF = Soil-to-air volatilization factor (m³/kg)
- EPC = Exposure point concentration
- ^(a) Exposure parameters were updated in addition to toxicity factors.
- CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
- CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
- RfDo = Oral reference dose (mg/kg-day)
- RfDi = Inhalation reference dose (mg/kg-day)
- VOC = Volatile organic chemical

Table C-21: Summary of Risks and Hazard Indices for Residential Scenario at Site 11, Unit 3

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
4,4'-DDD	7.7E-09	6.0E-08	6.8E-08	59%	1.9E-04	5.8E-03	5.8E-03	67%
4,4'-DDE	1.1E-10	8.7E-10	9.8E-10	1%	1.9E-06	6.0E-05	6.0E-05	1%
4,4'-DDT	4.9E-09	3.8E-08	4.3E-08	37%	8.4E-05	2.6E-03	2.6E-03	30%
alpha-Chlordane	1.4E-10	1.1E-09	1.2E-09	1%	2.3E-06	7.3E-05	7.3E-05	1%
delta-BHC	--	--	--	--	1.0E-09	3.1E-08	3.1E-08	0.0004%
Endosulfan I	--	--	--	--	7.7E-08	2.4E-06	2.4E-06	0.03%
gamma-BHC (Lindane)	1.8E-10	1.4E-09	1.6E-09	1%	1.4E-06	4.3E-05	4.3E-05	0.5%
gamma-Chlordane	1.2E-10	9.6E-10	1.1E-09	1%	2.1E-06	6.4E-05	6.4E-05	1%
Revised Cumulative Risk and Cumulative Hazard Index:			1.2E-07				0.01	

Notes:

^a - ED = Exposure Duration

^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.

^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

Table C-22: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 11, Unit 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	19	1	0.2	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	6.4E-09	1.3E-09	9.7E-13	7.7E-09	59%	1.6E-04	3.1E-05	2.4E-08	1.9E-04	67%
4,4'-DDE	19	4	0.00205	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	9.4E-11	1.9E-11	1.4E-14	1.1E-10	1%	1.6E-06	3.2E-07	2.4E-10	1.9E-06	1%
4,4'-DDT	19	3	0.089	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	4.1E-09	8.1E-10	6.1E-13	4.9E-09	37%	7.0E-05	1.4E-05	1.1E-08	8.4E-05	30%
alpha-Chlordane	19	3	0.0025	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	1.2E-10	2.3E-11	1.8E-14	1.4E-10	1%	2.0E-06	3.9E-07	7.4E-10	2.3E-06	1%
delta-BHC	19	1	0.0028	--	1.3E+00	--	1.3E+00	0.05	--	--	--	--	--	--	8.4E-10	1.7E-10	1.3E-13	1.0E-09	0.0004%
Endosulfan I	7	1	0.00099	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	6.5E-08	1.3E-08	9.8E-12	7.7E-08	0.03%
gamma-BHC (Lindane)	1	1	0.00088	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	--	1.5E-10	3.1E-11	2.3E-14	1.8E-10	1%	1.1E-06	2.3E-07	1.7E-10	1.4E-06	0.5%
gamma-Chlordane	19	1	0.0022	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	1.0E-10	2.1E-11	1.6E-14	1.2E-10	1%	1.7E-06	3.4E-07	6.5E-10	2.1E-06	1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 1.3E-08				TOTAL HI: 0.0003					

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:				Dermal Contact with Soil or Sediment:				Inhalation of Dust and VOCs:											
Soil ingestion rate (IRs) =	100	mg/d		CF =	1.0E-06	kg/mg		Inhalation Rate (InhR) =	0.83	m ³ /hr	m ³ /hr								
Conversion Factor (CF) =	1.00E-06	kg/mg		Body Surface Area (SA) =	5700	cm ² /event		Exposure Time (ET) =	24	hr/day	hr/day								
Fraction Contaminated Soil Ingested =	1	unitless		Adherence Factor (AF) =	0.07	mg/cm ²		EF =	100	d/yr	d/yr								
Exposure Frequency (EF) =	100	d/yr		EF =	100	d/yr		ED =	24	yr	yr								
Exposure Duration (ED) =	24	yr		ED =	24	yr		BW =	70	kg	kg								
Body Weight (BW) =	70	kg		BW =	70	kg		Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg	m ³ /kg								
Carcinogenic Averaging Time (ATc) =	25550	days		ATc =	25550	days		ATc =	25550	days	days								
Noncarcinogenic Averaging Time (ATnc) =	8760	days		ATnc =	8760	days		ATnc =	8760	days	days								

NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-23: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 11, Unit 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	19	1	0.2	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	5.3E-08	7.4E-09	2.0E-12	6.0E-08	59%	5.1E-03	7.2E-04	2.0E-07	5.8E-03	67%
4,4'-DDE	19	4	0.00205	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	7.6E-10	1.1E-10	2.9E-14	8.7E-10	1%	5.2E-05	7.3E-06	2.0E-09	6.0E-05	1%
4,4'-DDT	19	3	0.089	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	3.3E-08	4.6E-09	1.3E-12	3.8E-08	37%	2.3E-03	3.2E-04	8.7E-08	2.6E-03	30%
alpha-Chlordane	19	3	0.0025	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	9.6E-10	1.3E-10	3.7E-14	1.1E-09	1%	6.4E-05	8.9E-06	6.1E-09	7.3E-05	1%
delta-BHC	19	1	0.0028	--	1.3E+00	--	1.3E+00	0.05	--	--	--	--	--	--	2.8E-08	3.9E-09	1.1E-12	3.1E-08	0.0004%
Endosulfan I	7	1	0.00099	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	2.1E-06	3.0E-07	8.1E-11	2.4E-06	0.03%
gamma-BHC (Lindane)	1	1	0.00088	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	--	1.3E-09	1.8E-10	4.8E-14	1.4E-09	1%	3.8E-05	5.3E-06	1.4E-09	4.3E-05	0.5%
gamma-Chlordane	19	1	0.0022	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	8.4E-10	1.2E-10	3.2E-14	9.6E-10	1%	5.6E-05	7.9E-06	5.4E-09	6.4E-05	1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :													TOTAL RISK:	1.0E-07	TOTAL HI: 0.0087				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:			Dermal Contact with Soil or Sediment:			Inhalation of Dust and VOCs:			NA = Not available or not applicable		CSFo = Oral cancer slope factor (mg/kg-day) ⁻¹	
Soil ingestion rate (IRs) = 200 mg/d			CF = 1.0E-06 kg/mg			Inhalation Rate (InhR) = 0.42 m ³ /hr			-- = Information not available or not applicable		CSFi = Inhalation cancer slope factor (mg/kg-day) ⁻¹	
Conversion Factor (CF) = 1.00E-06 kg/mg			Body Surface Area (SA) = 2800 cm ² /event			Exposure Time (ET) = 24 hr/day			HI = Hazard index		RfDo = Oral reference dose (mg/kg-day)	
Fraction Contaminated Soil Ingested = 1 unitless			Soil Adherence Factor (AF) = 0.2 mg/cm ²			EF = 350 d/yr			HQ = Hazard quotient		RfDi = Inhalation reference dose (mg/kg-day)	
Exposure Frequency (EF) = 350 d/yr			ED = 6 yr			ED = 6 yr			mg/kg = Milligrams per kilogram		VOC = Volatile organic chemical	
Exposure Duration (ED) = 6 yr			BW = 15 kg			BW = 15 kg			ABS = Dermal absorption factor (unitless)			
Body Weight (BW) = 15 kg			ATc = 25550 days			ATc = 25550 days			VF = Soil-to-air volatilization factor (m ³ /kg)			
Carcinogenic Averaging Time (ATc) = 25550 days			ATnc = 2190 days			ATnc = 2190 days			EPC = Exposure point concentration			
Noncarcinogenic Averaging Time (ATnc) = 2190 days									^(a) Exposure parameters were updated in addition to toxicity factors.			

Table C-24: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 11, Unit 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
4,4'-DDD	12	1	0.2	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	8.4E-09	5.5E-09	8.5E-13	1.4E-08	59%	2.0E-04	1.3E-04	2.0E-08	3.2E-04	67%
4,4'-DDE	12	4	0.002	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.2E-10	7.8E-11	1.2E-14	2.0E-10	1%	2.0E-06	1.3E-06	2.0E-10	3.2E-06	1%
4,4'-DDT	12	3	0.089	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	5.3E-09	3.5E-09	5.3E-13	8.8E-09	37%	8.7E-05	5.7E-05	8.8E-09	1.4E-04	30%
alpha-Chlordane	12	3	0.0025	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	1.5E-10	1.0E-10	1.5E-14	2.5E-10	1%	2.4E-06	1.6E-06	6.2E-10	4.1E-06	1%
delta-BHC	12	1	0.0028	—	1.3E+00	—	1.3E+00	0.05	—	—	—	—	—	—	1.1E-09	7.0E-10	1.1E-13	1.7E-09	0.0004%
Endosulfan I	7	1	0.00099	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	8.1E-08	5.3E-08	8.1E-12	1.3E-07	0.03%
gamma-BHC (Lindane)	1	1	0.00088	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	—	2.0E-10	1.3E-10	2.0E-14	3.3E-10	1%	1.4E-06	9.5E-07	1.4E-10	2.4E-06	0.5%
gamma-Chlordane	12	1	0.0022	3.50E-01	5.00E-04	3.50E-01	2.00E-04	0.05	—	1.3E-10	8.9E-11	1.4E-14	2.2E-10	1%	2.2E-06	1.4E-06	5.4E-10	3.6E-06	1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK:		2.4E-08		TOTAL HI:		0.0005			

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:			Dermal Contact with Soil or Sediment:			Inhalation of Dust and VOCs:			NA = Not available or not applicable			CSFo = Oral cancer slope factor (mg/kg-day) ⁻¹		
Soil ingestion rate (IRs) =	50	mg/d	CF =	1.00E-06	kg/mg	Inhalation Rate (InhR) =	0.83	m ³ /hr	— = Information not available or not applicable			CSFi = Inhalation cancer slope factor (mg/kg-day) ⁻¹		
Conversion Factor (CF) =	1.00E-06	kg/mg	Body Surface Area (SA) =	3300	cm ² /event	Exposure Time (ET) =	8	hr/day	HI = Hazard index			RfDo = Oral reference dose (mg/kg-day)		
Fraction Contaminated Soil Ingested =	1	unitless	Soil Adherence Factor (AF) =	0.2	mg/cm ²	EF =	250	d/yr	HQ = Hazard quotient			RfDi = Inhalation reference dose (mg/kg-day)		
Exposure Frequency (EF) =	250	d/yr	EF =	250	d/yr	ED =	25	yr	mg/kg = Milligrams per kilogram			VOC = Volatile organic chemical		
Exposure Duration (ED) =	25	yr	ED =	25	yr	BW =	70	kg	ABS = Dermal absorption factor (unitless)					
Body Weight (BW) =	70	kg	BW =	70	kg	Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg	VF = Soil-to-air volatilization factor (m ³ /kg)					
Carcinogenic Averaging Time (ATc) =	25550	days	ATc =	25550	days	ATc =	25550	days	EPC = Exposure point concentration					
Noncarcinogenic Averaging Time (ATnc) =	9125	days	ATnc =	9125	days	ATnc =	9125	days	^(a) Exposure parameters were updated in addition to toxicity factors.					

Table C-25: Summary of Risks and Hazard Indices for Residential Scenario at Site 12, Unit 1

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
2-Butanone	--	--	--	--	4.5E-08	4.3E-07	4.3E-07	0.00002%
Acetone	--	--	--	--	1.3E-06	1.3E-05	1.3E-05	0.0005%
Carbon tetrachloride	3.7E-09	8.3E-09	1.2E-08	0.05%	2.9E-04	2.5E-03	2.5E-03	0.1%
Toluene	--	--	--	--	1.4E-06	1.2E-05	1.2E-05	0.0005%
Benz(a)anthracene	1.1E-07	7.8E-07	8.9E-07	4%	2.2E-05	6.3E-04	6.3E-04	0.02%
Benzo(a)pyrene	1.0E-06	7.6E-06	8.7E-06	35%	2.1E-05	6.1E-04	6.1E-04	0.02%
Benzo(b)fluoranthene	1.3E-07	9.5E-07	1.1E-06	4%	2.6E-05	7.6E-04	7.6E-04	0.03%
Benzo(g,h,i)perylene	--	--	--	--	1.1E-05	3.1E-04	3.1E-04	0.01%
Benzo(k)fluoranthene	8.5E-09	6.1E-08	7.0E-08	0.3%	1.7E-05	4.9E-04	4.9E-04	0.02%
Chrysene	1.6E-09	1.1E-08	1.3E-08	0.1%	3.1E-05	9.1E-04	9.1E-04	0.03%
Dibenz(a,h)anthracene	4.7E-07	3.4E-06	3.9E-06	16%	9.4E-06	2.7E-04	2.7E-04	0.01%
Fluoranthene	--	--	--	--	2.0E-05	5.9E-04	5.9E-04	0.02%
Indeno(1,2,3-cd)pyrene	6.9E-08	5.0E-07	5.7E-07	2%	1.4E-05	4.0E-04	4.0E-04	0.02%
Phenanthrene	--	--	--	--	1.1E-05	3.1E-04	3.1E-04	0.01%
Pyrene	--	--	--	--	2.3E-05	6.7E-04	6.7E-04	0.03%
4,4'-DDD	1.4E-10	1.1E-09	1.2E-09	0.005%	3.3E-06	1.0E-04	1.0E-04	0.004%
4,4'-DDE	1.6E-09	1.2E-08	1.4E-08	0.1%	2.7E-05	8.5E-04	8.5E-04	0.03%
4,4'-DDT	8.5E-10	6.6E-09	7.5E-09	0.03%	1.5E-05	4.5E-04	4.5E-04	0.02%
alpha-Chlordane	5.9E-11	4.5E-10	5.1E-10	0.002%	9.8E-07	3.0E-05	3.0E-05	0.001%
Aroclor 1254	1.2E-07	8.6E-07	9.8E-07	4%	8.6E-03	2.5E-01	2.5E-01	10%
Aroclor 1260	1.1E-08	7.9E-08	9.0E-08	0.4%	7.9E-04	2.3E-02	2.3E-02	1%
beta-BHC	8.4E-10	6.5E-09	7.4E-09	0.03%	1.0E-09	3.3E-08	3.3E-08	0.000001%
delta-BHC	--	--	--	--	8.4E-10	2.5E-08	2.5E-08	0.000001%
Dieldrin	5.2E-09	4.0E-08	4.6E-08	0.2%	1.9E-05	5.9E-04	5.9E-04	0.02%
Endosulfan I	--	--	--	--	1.3E-07	3.9E-06	3.9E-06	0.0001%
Endosulfan sulfate	--	--	--	--	4.1E-07	1.3E-05	1.3E-05	0.0005%
Endrin aldehyde	--	--	--	--	6.4E-06	2.0E-04	2.0E-04	0.01%
Endrin ketone	--	--	--	--	1.0E-05	3.1E-04	3.1E-04	0.01%
gamma-Chlordane	5.9E-11	4.5E-10	5.1E-10	0.002%	9.8E-07	3.0E-05	3.0E-05	0.001%
Heptachlor epoxide	3.5E-09	2.7E-08	3.1E-08	0.1%	8.7E-05	2.7E-03	2.7E-03	0.1%
2,4,5-T	--	--	--	--	2.7E-07	8.5E-06	8.5E-06	0.000%
2,4-DB	--	--	--	--	8.2E-06	2.6E-04	2.6E-04	0.01%
Dalapon	--	--	--	--	3.1E-06	9.6E-05	9.6E-05	0.004%
MCPA	--	--	--	--	2.6E-03	8.0E-02	8.0E-02	3%
MCPP	--	--	--	--	4.4E-02	1.4E+00	1.4E+00	53%
Aluminum	--	--	--	--	6.5E-03	1.9E-01	1.9E-01	7%
Antimony	--	--	--	--	--	--	--	--
Arsenic	9.3E-07	7.3E-06	8.2E-06	33%	6.0E-03	1.9E-01	1.9E-01	7%
Barium	--	--	--	--	1.1E-03	3.4E-02	3.4E-02	1%
Beryllium	--	--	--	--	--	--	--	--
Cadmium	1.8E-10	3.7E-10	5.5E-10	0.002%	1.1E-03	3.6E-02	3.6E-02	1%
Chromium	1.3E-08	2.7E-08	4.0E-08	0.2%	--	--	--	--
Cobalt	--	--	--	--	4.1E-05	1.3E-03	1.3E-03	0.1%
Copper	--	--	--	--	1.4E-04	4.4E-03	4.4E-03	0.2%
Lead	--	--	--	--	--	--	--	--
Manganese	--	--	--	--	6.2E-03	1.7E-01	1.7E-01	7%
Mercury	--	--	--	--	--	--	--	--
Nickel	--	--	--	--	1.7E-04	5.6E-03	5.6E-03	0.2%
Selenium	--	--	--	--	--	--	--	--
Silver	--	--	--	--	4.8E-03	1.5E-01	1.5E-01	6%
Thallium	--	--	--	--	--	--	--	--
Vanadium	--	--	--	--	2.1E-03	6.8E-02	6.8E-02	3%
Zinc	--	--	--	--	9.3E-05	3.0E-03	3.0E-03	0.1%
Revised Cumulative Risk and Cumulative Hazard Index:	2.5E-05				2.60			

Notes:

^a - ED = Exposure Duration^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

Table C-26: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 12, Unit 1

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
2-Butanone	2	2	0.003	--	6.0E-01	--	2.9E-01	0.1	1.9E+04	--	--	--	--	--	2.0E-09	7.8E-10	4.2E-08	4.5E-08	0.0001%
Acetone	11	3	0.019	--	1.0E-01	--	1.0E-01	0.1	1.3E+04	--	--	--	--	--	7.4E-08	3.0E-08	1.2E-06	1.3E-06	0.002%
Carbon tetrachloride	1	1	0.005	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	8.7E-11	3.5E-11	3.6E-09	3.7E-09	0.1%	2.8E-06	1.1E-06	2.8E-04	2.9E-04	0.34%
Toluene	11	5	0.00684	--	2.0E-01	--	1.1E-01	0.1	3.6E+03	--	--	--	--	--	1.3E-08	5.3E-09	1.4E-06	1.4E-06	0.002%
Benz(a)anthracene	15	3	0.69	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	6.8E-08	4.0E-08	4.3E-12	1.1E-07	4%	1.4E-05	8.1E-06	4.8E-08	2.2E-05	0.03%
Benzo(a)pyrene	15	3	0.67	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	--	6.6E-07	3.9E-07	4.2E-11	1.0E-06	36%	1.3E-05	7.8E-06	4.6E-08	2.1E-05	0.02%
Benzo(b)fluoranthene	15	3	0.84	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	8.2E-08	4.9E-08	5.3E-12	1.3E-07	5%	1.6E-05	9.8E-06	5.8E-08	2.6E-05	0.03%
Benzo(g,h,i)perylene	6	3	0.34	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	6.7E-06	4.0E-06	2.3E-08	1.1E-05	0.01%
Benzo(k)fluoranthene	15	3	0.54	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	--	5.3E-09	3.2E-09	3.4E-13	8.5E-09	0.3%	1.1E-05	6.3E-06	3.7E-08	1.7E-05	0.02%
Chrysene	15	3	1	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	--	9.8E-10	5.9E-10	6.3E-14	1.6E-09	0.1%	2.0E-05	1.2E-05	6.9E-08	3.1E-05	0.04%
Dibenz(a,h)anthracene	4	1	0.3	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	--	2.9E-07	1.8E-07	1.9E-11	4.7E-07	16%	5.9E-06	3.5E-06	2.1E-08	9.4E-06	0.01%
Fluoranthene	15	3	1.3	--	4.0E-02	--	4.0E-02	0.15	--	--	--	--	--	--	1.3E-05	7.6E-06	1.9E-09	2.0E-05	0.02%
Indeno(1,2,3-cd)pyrene	15	1	0.44	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	--	4.3E-08	2.6E-08	2.8E-12	6.9E-08	2%	8.6E-06	5.2E-06	3.0E-08	1.4E-05	0.02%
Phenanthrene	6	1	0.34	--	2.0E-02	--	8.6E-04	0.15	--	--	--	--	--	--	6.7E-06	4.0E-06	2.3E-08	1.1E-05	0.01%
Pyrene	15	3	1.1	--	3.0E-02	--	3.0E-02	0.15	--	--	--	--	--	--	1.4E-05	8.6E-06	2.2E-09	2.3E-05	0.03%
4,4'-DDD	23	8	0.00352	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	--	1.1E-10	2.3E-11	1.7E-14	1.4E-10	0.005%	2.8E-06	5.5E-07	4.2E-10	3.3E-06	0.004%
4,4'-DDE	24	12	0.029	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	1.3E-09	2.6E-10	2.0E-13	1.6E-09	0.1%	2.3E-05	4.5E-06	3.4E-09	2.7E-05	0.03%
4,4'-DDT	24	11	0.0156	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	--	7.1E-10	1.4E-10	1.1E-13	8.5E-10	0.03%	1.2E-05	2.4E-06	1.8E-09	1.5E-05	0.02%
alpha-Chlordane	21	4	0.00104	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	4.9E-11	9.7E-12	7.4E-15	5.9E-11	0.002%	8.1E-07	1.6E-07	3.1E-10	9.8E-07	0.00%
Aroclor 1254	21	1	0.283	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	7.6E-08	4.2E-08	1.1E-11	1.2E-07	4%	5.5E-03	3.1E-03	8.4E-07	8.6E-03	10%
Aroclor 1260	19	1	0.026	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	--	7.0E-09	3.9E-09	1.1E-12	1.1E-08	0.4%	5.1E-04	2.8E-04	7.7E-08	7.9E-04	1%
beta-BHC	19	1	0.0029	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.05	--	7.0E-10	1.4E-10	1.1E-13	8.4E-10	0.03%	8.7E-10	1.7E-10	1.3E-13	1.0E-09	0.000001%
delta-BHC	19	1	0.002	--	1.3E+00	--	1.3E+00	0.1	--	--	--	--	--	--	6.0E-10	2.4E-10	9.1E-14	8.4E-10	0.000001%
Dieldrin	22	4	0.00202	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	--	4.3E-09	8.7E-10	6.6E-13	5.2E-09	0.2%	1.6E-05	3.2E-06	2.4E-09	1.9E-05	0.02%
Endosulfan I	19	1	0.0016	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	1.0E-07	2.1E-08	1.6E-11	1.3E-07	0.0001%
Endosulfan sulfate	19	2	0.0052	--	6.0E-03	--	6.0E-03	0.05	--	--	--	--	--	--	3.4E-07	6.8E-08	5.1E-11	4.1E-07	0.0005%
Endrin aldehyde	19	1	0.0041	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	5.3E-06	1.1E-06	8.1E-10	6.4E-06	0.01%
Endrin ketone	19	1	0.0064	--	3.0E-04	--	3.0E-04	0.05	--	--	--	--	--	--	8.3E-06	1.7E-06	1.3E-09	1.0E-05	0.01%
gamma-Chlordane	21	4	0.00104	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	--	4.9E-11	9.7E-12	7.4E-15	5.9E-11	0.002%	8.1E-07	1.6E-07	3.1E-10	9.8E-07	0.001%
Heptachlor epoxide	19	2	0.0024	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	--	2.9E-09	5.8E-10	4.4E-13	3.5E-09	0.1%	7.2E-05	1.4E-05	1.1E-08	8.7E-05	0.1%
2,4,5-T	8	1	0.0058	--	1.0E-02	--	1.0E-02	0.05	--	--	--	--	--	--	2.3E-07	4.5E-08	3.4E-11	2.7E-07	0.0003%
2,4-DB	12	1	0.14	--	8.0E-03	--	8.0E-03	0.05	--	--	--	--	--	--	6.8E-06	1.4E-06	1.0E-09	8.2E-06	0.01%
Dalapon	12	1	0.198	--	3.0E-02	--	3.0E-02	0.05	--	--	--	--	--	--	2.6E-06	5.2E-07	3.9E-10	3.1E-06	0.004%
MCPA	9	1	5.5	--	1.0E-03	--	1.0E-03	0.05	--	--	--	--	--	--	2.2E-03	4.3E-04	3.3E-07	2.6E-03	3%
MCPP	12	1	94	--	1.0E-03	--	1.0E-03	0.05	--	--	--	--	--	--	3.7E-02	7.3E-03	5.6E-06	4.4E-02	52%
Aluminum	20	20	14400	--	1.0E+00	--	1.4E-03	0.01	--	--	--	--	--	--	5.6E-03	2.2E-04	6.1E-04	6.5E-03	8%
Antimony	12	2	--	--	4.0E-04	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Arsenic	20	12	4.1	1.5E+00	3.0E-04	1.5E+01	--	0.03	--	8.3E-07	9.9E-08	1.3E-09	9.3E-07	32%	5.3E-03	6.4E-04	--	6.0E-03	7%
Barium	20	20	177	--	7.0E-02	--	1.4E-04	0.01	--	--	--	--	--	--	9.9E-04	3.9E-05	7.3E-05	1.1E-03	1%
Beryllium	20	11	--	--	2.0E-03	8.4E+00	5.7E-06	0.01	--	--	--	--	--	--	--	--	--	--	--
Cadmium	20	20	1.4	--	5.0E-04	6.3E+00	--	0.001	--	--	--	1.8E-10	1.8E-10	0.01%	1.1E-03	4.4E-06	--	1.1E-03	1%
Chromium	20	20	15.4	--	--	4.2E+01	--	0.01	--	--	--	1.3E-08	1.3E-08	0.4%	--	--	--	--	--
Cobalt	20	20	6.1	--	6.0E-02	--	--	0.01	--	--	--	--	--	--	4.0E-05	1.6E-06	--	4.1E-05	0.05%
Copper	20	20	12.4	--	3.7E-02	--	--	0.01	--	--	--	--	--	--	1.3E-04	5.2E-06	--	1.4E-04	0.2%
Lead	20	20	239	--	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Manganese	20	20	293	--	2.4E-02	--	1.4E-05	0.01	--	--	--	--	--	--	4.8E-03	1.9E-04	1.2E-03	6.2E-03	7%
Mercury	20	3	--	--	--	--	8.6E-05	0.01	--	--	--	--	--	--	--	--	--	--	--
Nickel	20	20	8.5	--	2.0E-02	--	--	0.01	--	--	--	--	--	--	1.7E-04	6.6E-06	--	1.7E-04	0.2%
Selenium	20	2	--	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Silver	20	3	58.9	--	5.0E-03	--	--	0.01	--	--	--	--	--	--	4.6E-03	1.8E-04	--	4.8E-03	6%
Thallium	15	8	--	--	6.6E-05	--	--	0.01	--	--	--	--	--	--	--	--	--	--	--
Vanadium	20	20	36	--	7.0E-03	--	--	0.01	--	--	--	--	--	--	2.0E-03	8.0E-05	--	2.1E-03	2%
Zinc	20	20	68.7	--	3.0E-01	--	--	0.01	--	--	--	--	--	--	9.0E-05	3.6E-06	--	9.3E-05	0.1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 2.9E-06					TOTAL HI: 0.09				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	100	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	100	d/yr
Exposure Duration (ED) =	24	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	8760	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	5700	cm ² /event
Soil Adherence Factor (AF) =	0.07	mg/cm ²
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
ATc =	25550	days
ATnc =	8760	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	8760	days

Notes:

NA = Not available or not applicable

-- = Information not available or not applicable

HI = Hazard index

HQ = Hazard quotient

mg/kg = Milligrams per kilogram

ABS = Dermal absorption factor (unitless)

VF = Soil-to-air volatilization factor (m³/kg)

EPC = Exposure point concentration

^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹

CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹

RfDo = Oral reference dose (mg/kg-day)

RfDi = Inhalation reference dose (mg/kg-day)

VOC = Volatile organic chemical

Table C-27: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 12, Unit 1

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
2-Butanone	2	2	0.003	—	6.0E-01	—	2.9E-01	0.1	1.9E+04	—	—	—	—	—	6.4E-08	1.8E-08	3.5E-07	4.3E-07	0.00002%
Acetone	11	3	0.019	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	2.4E-06	6.8E-07	9.8E-06	1.3E-05	0.0005%
Carbon tetrachloride	1	1	0.005	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	7.1E-10	2.0E-10	7.4E-09	8.3E-09	0.04%	9.1E-05	2.6E-05	2.3E-03	2.5E-03	0.09%
Toluene	11	5	0.00684	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	4.4E-07	1.2E-07	1.1E-05	1.2E-05	0.0005%
Benz(a)anthracene	15	3	0.69	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	5.5E-07	2.3E-07	9.0E-12	7.8E-07	4%	4.4E-04	1.9E-04	3.9E-07	6.3E-04	0.02%
Benzo(a)pyrene	15	3	0.67	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	5.4E-06	2.3E-06	8.7E-11	7.6E-06	35%	4.3E-04	1.8E-04	3.8E-07	6.1E-04	0.03%
Benzo(b)fluoranthene	15	3	0.84	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	6.7E-07	2.8E-07	1.1E-11	9.5E-07	4%	5.4E-04	2.3E-04	4.8E-07	7.6E-04	0.01%
Benzo(g,h,i)perylene	6	3	0.34	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	2.2E-04	9.1E-05	1.9E-07	3.1E-04	0.02%
Benzo(k)fluoranthene	15	3	0.54	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	—	4.3E-08	1.8E-08	7.0E-13	6.1E-08	0.3%	3.5E-04	1.4E-04	3.1E-07	4.9E-04	0.03%
Chrysene	15	3	1	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	8.0E-09	3.4E-09	1.3E-13	1.1E-08	0.1%	6.4E-04	2.7E-04	5.7E-07	9.1E-04	0.01%
Dibenz(a,h)anthracene	4	1	0.3	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	2.4E-06	1.0E-06	3.9E-11	3.4E-06	16%	1.9E-04	8.1E-05	1.7E-07	2.7E-04	0.02%
Fluoranthene	15	3	1.3	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	4.2E-04	1.7E-04	1.6E-08	5.9E-04	0.02%
Indeno(1,2,3-cd)pyrene	15	1	0.44	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	3.5E-07	1.5E-07	5.7E-12	5.0E-07	2%	2.8E-04	1.2E-04	2.5E-07	4.0E-04	0.01%
Phenanthrene	6	1	0.34	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	2.2E-04	9.1E-05	1.9E-07	3.1E-04	0.03%
Pyrene	15	3	1.1	—	3.0E-02	—	3.0E-02	0.15	—	—	—	—	—	—	4.7E-04	2.0E-04	1.8E-08	6.7E-04	0.004%
4,4'-DDD	23	8	0.00352	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	9.3E-10	1.3E-10	3.5E-14	1.1E-09	0.005%	9.0E-05	1.3E-05	3.4E-09	1.0E-04	0.03%
4,4'-DDE	24	12	0.029	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.1E-08	1.5E-09	4.1E-13	1.2E-08	0.1%	7.4E-04	1.0E-04	2.8E-08	8.5E-04	0.02%
4,4'-DDT	24	11	0.0156	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	5.8E-09	8.1E-10	2.2E-13	6.6E-09	0.03%	4.0E-04	5.6E-05	1.5E-08	4.5E-04	0.001%
alpha-Chlordane	21	4	0.00104	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	4.0E-10	5.6E-11	1.5E-14	4.5E-10	0.002%	2.7E-05	3.7E-06	2.5E-09	3.0E-05	10%
Aroclor 1254	21	1	0.283	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	6.2E-07	2.4E-07	2.4E-11	8.6E-07	4%	1.8E-01	7.1E-02	6.9E-06	2.5E-01	1%
Aroclor 1260	19	1	0.026	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	5.7E-08	2.2E-08	2.2E-12	7.9E-08	0.4%	2.9E-08	4.0E-09	1.1E-12	3.3E-08	0.000001%
beta-BHC	19	1	0.0029	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.1	—	—	—	—	—	—	2.0E-08	5.5E-09	7.5E-13	2.5E-08	0.000001%
delta-BHC	19	1	0.002	—	1.3E+00	—	1.3E+00	0.1	—	—	—	—	—	—	5.2E-04	7.2E-05	2.0E-08	5.9E-04	0.02%
Dieldrin	22	4	0.00202	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	3.5E-08	5.0E-09	1.4E-12	4.0E-08	0.2%	3.4E-06	4.8E-07	1.3E-10	3.9E-06	0.0001%
Endosulfan I	19	1	0.0016	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.1E-05	1.6E-06	4.2E-10	1.3E-05	0.0005%
Endosulfan sulfate	19	2	0.0052	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.7E-04	2.4E-05	6.7E-09	2.0E-04	0.01%
Endrin aldehyde	19	1	0.0041	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	2.7E-04	3.8E-05	1.0E-08	3.1E-04	0.01%
Endrin ketone	19	1	0.0064	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	2.7E-05	3.7E-06	2.5E-09	3.0E-05	0.001%
gamma-Chlordane	21	4	0.00104	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	4.0E-10	5.6E-11	1.5E-14	4.5E-10	0.002%	2.4E-03	3.3E-04	9.0E-08	2.7E-03	0.1%
Heptachlor epoxide	19	2	0.0024	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	—	2.4E-08	3.4E-09	9.2E-13	2.7E-08	0.1%	7.4E-06	1.0E-06	2.8E-10	8.5E-06	0.0003%
2,4,5-T	8	1	0.0058	—	1.0E-02	—	1.0E-02	0.05	—	—	—	—	—	—	2.2E-04	3.1E-05	8.6E-09	2.6E-04	0.01%
2,4-DB	12	1	0.14	—	8.0E-03	—	8.0E-03	0.05	—	—	—	—	—	—	8.4E-05	1.2E-05	3.2E-09	9.6E-05	0.00%
Dalapon	12	1	0.198	—	3.0E-02	—	3.0E-02	0.05	—	—	—	—	—	—	7.0E-02	9.8E-03	2.7E-06	8.0E-02	3%
MCPA	9	1	5.5	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	1.2E+00	1.7E-01	4.6E-05	1.4E+00	53%
MCPP	12	1	94	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	1.8E-01	5.2E-03	5.0E-03	1.9E-01	7%
Aluminum	20	20	14400	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	—	—	—	—	—
Antimony	12	2	—	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Arsenic	20	12	4.1	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	6.7E-06	5.7E-07	2.6E-09	7.3E-06	34%	1.7E-01	1.5E-02	—	1.9E-01	7%
Barium	20	20	177	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	3.2E-02	9.1E-04	6.1E-04	3.4E-02	1%
Beryllium	20	11	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	20	20	1.4	—	5.0E-04	6.3E+00	—	0.001	—	—	—	3.7E-10	3.7E-10	0.002%	3.6E-02	1.0E-04	—	3.6E-02	1%
Chromium	20	20	15.4	—	—	4.2E+01	—	0.01	—	—	—	2.7E-08	2.7E-08	0.1%	—	—	—	—	—
Cobalt	20	20	6.1	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	1.3E-03	3.6E-05	—	1.3E-03	0.1%
Copper	20	20	12.4	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	4.3E-03	1.2E-04	—	4.4E-03	0.2%
Lead	20	20	239	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	20	20	293	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	1.6E-01	4.4E-03	1.0E-02	1.7E-01	7%
Mercury	20	3	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	—	—	—
Nickel	20	20	8.5	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	5.4E-03	1.5E-04	—	5.6E-03	0.2%
Selenium	20	2	—	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Silver	20	3	58.9	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	1.5E-01	4.2E-03	—	1.5E-01	6%
Thallium	15	8	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	20	20	36	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	6.6E-02	1.8E-03	—	6.8E-02	3%
Zinc	20	20	68.7	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	2.9E-03	8.2E-05	—	3.0E-03	0.1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 2.2E-05					TOTAL HI: 2.60				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	200	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	350	d/yr
Exposure Duration (ED) =	6	yr
Body Weight (BW) =	15	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	2190	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	2800	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
ATc =	25550	days
ATnc =	2190	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.42	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg
ATc =	25550	days
ATnc =	2190	days

Notes:

NA = Not available or not applicable
 — = Information not available or not applicable
 HI = Hazard index
 HQ = Hazard quotient
 mg/kg = Milligrams per kilogram
 ABS = Dermal absorption factor (unitless)
 VF = Soil-to-air volatilization factor (m³/kg)
 EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
 CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
 RfDo = Oral reference dose (mg/kg-day)
 RfDi = Inhalation reference dose (mg/kg-day)
 VOC = Volatile organic chemical
 Shading indicates constituent is within background.

Table C-28: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 12, Unit 1

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
Acetone	7	2	0.019	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	9.3E-08	1.2E-07	9.8E-07	1.2E-06	0.2%
Carbon tetrachloride	1	1	0.005	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	1.1E-10	1.5E-10	3.1E-09	3.4E-09	0.05%	3.5E-06	4.6E-06	2.4E-04	2.4E-04	0.001%
Toluene	7	5	0.01	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	2.4E-08	3.2E-08	1.7E-06	1.7E-06	0.04%
Benz(a)anthracene	9	3	0.69	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	8.8E-08	1.7E-07	3.8E-12	2.6E-07	4%	1.7E-05	3.3E-05	4.0E-08	5.0E-05	0.04%
Benzo(a)pyrene	9	3	0.67	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	8.5E-07	1.7E-06	3.7E-11	2.5E-06	37%	1.6E-05	3.2E-05	3.8E-08	4.9E-05	0.04%
Benzo(b)fluoranthene	9	3	0.84	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.1E-07	2.1E-07	4.6E-12	3.2E-07	5%	2.1E-05	4.1E-05	4.8E-08	6.1E-05	0.02%
Benzo(g,h,i)perylene	4	3	0.34	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	8.3E-06	1.6E-05	2.0E-08	2.5E-05	0.03%
Benzo(k)fluoranthene	9	3	0.54	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	—	6.9E-09	1.4E-08	3.0E-13	2.1E-08	0.3%	1.3E-05	2.6E-05	3.1E-08	3.9E-05	0.05%
Chrysene	9	3	1	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	1.3E-09	2.5E-09	5.5E-14	3.8E-09	0.1%	2.4E-05	4.8E-05	5.7E-08	7.3E-05	0.02%
Dibenz(a,h)anthracene	2	1	0.3	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	3.8E-07	7.6E-07	1.6E-11	1.1E-06	17%	7.3E-06	1.5E-05	1.7E-08	2.2E-05	0.03%
Fluoranthene	9	3	1.3	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	1.6E-05	3.1E-05	1.6E-09	4.7E-05	0.02%
Indeno(1,2,3-cd)pyrene	9	1	0.44	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	5.6E-08	1.1E-07	2.4E-12	1.7E-07	2%	1.1E-05	2.1E-05	2.5E-08	3.2E-05	0.02%
Phenanthrene	4	1	0.34	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	8.3E-06	1.6E-05	2.0E-08	2.5E-05	0.04%
Pyrene	9	3	1.1	—	3.0E-02	—	3.0E-02	0.15	—	—	—	—	—	—	1.8E-05	3.6E-05	1.8E-09	5.3E-05	0.06%
4,4'-DDD	13	8	0.0517	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	2.2E-09	1.4E-09	2.2E-13	3.6E-09	0.1%	5.1E-05	3.3E-05	5.1E-09	8.4E-05	0.3%
4,4'-DDE	13	10	0.229	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.4E-08	9.0E-09	1.4E-12	2.3E-08	0.3%	2.2E-04	1.5E-04	2.3E-08	3.7E-04	0.3%
4,4'-DDT	13	9	0.24	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.4E-08	9.4E-09	1.4E-12	2.4E-08	0.3%	2.3E-04	1.5E-04	2.4E-08	3.9E-04	0.01%
alpha-Chlordane	11	4	0.00436	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	2.7E-10	1.8E-10	2.7E-14	4.4E-10	0.01%	4.3E-06	2.8E-06	1.1E-09	7.1E-06	14%
Aroclor 1254	11	1	0.283	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	9.9E-08	1.8E-07	1.0E-11	2.8E-07	4%	6.9E-03	1.3E-02	7.0E-07	2.0E-02	1%
Aroclor 1260	9	1	0.026	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	9.1E-09	1.7E-08	9.2E-13	2.6E-08	0.4%	6.4E-04	1.2E-03	6.4E-08	1.8E-03	0.1%
Dieldrin	12	4	0.00911	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	2.5E-08	1.7E-08	2.6E-12	4.2E-08	1%	8.9E-05	5.9E-05	9.0E-09	1.5E-04	0.0002%
Endosulfan I	9	1	0.0016	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.3E-07	8.6E-08	1.3E-11	2.2E-07	0.001%
Endosulfan sulfate	9	2	0.0052	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	4.2E-07	2.8E-07	4.3E-11	7.0E-07	0.01%
Endrin aldehyde	9	1	0.0041	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	6.7E-06	4.4E-06	6.7E-10	1.1E-05	0.01%
Endrin ketone	9	1	0.0064	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	1.0E-05	6.9E-06	1.1E-09	1.7E-05	0.01%
gamma-Chlordane	11	4	0.00439	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	2.7E-10	1.8E-10	2.7E-14	4.5E-10	0.01%	4.3E-06	2.8E-06	1.1E-09	7.1E-06	0.1%
Heptachlor epoxide	9	2	0.0024	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	—	3.8E-09	2.5E-09	3.9E-13	6.3E-09	0.1%	9.0E-05	6.0E-05	9.1E-09	1.5E-04	0.0003%
2,4,5-T	4	1	0.0058	—	1.0E-02	—	1.0E-02	0.05	—	—	—	—	—	—	2.8E-07	1.9E-07	2.9E-11	4.7E-07	0.01%
2,4-DB	6	1	0.14	—	8.0E-03	—	8.0E-03	0.05	—	—	—	—	—	—	8.6E-06	5.7E-06	8.6E-10	1.4E-05	3%
MCPA	4	1	5.5	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	2.7E-03	1.8E-03	2.7E-07	4.5E-03	56%
MCPP	6	1	94	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	4.6E-02	3.0E-02	4.6E-06	7.6E-02	5%
Aluminum	11	11	12300	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	6.0E-03	7.9E-04	4.3E-04	7.2E-03	—
Antimony	8	1	—	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Arsenic	11	8	5.49	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	1.4E-06	5.7E-07	1.5E-09	2.0E-06	29%	9.0E-03	3.5E-03	—	1.2E-02	9%
Barium	11	11	180	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	1.3E-03	1.7E-04	6.2E-05	1.5E-03	1%
Beryllium	11	7	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	11	11	1.6	—	5.0E-04	6.3E+00	—	0.001	—	—	—	1.8E-10	1.8E-10	0.003%	1.6E-03	2.1E-05	—	1.6E-03	1%
Chromium	11	11	15.4	—	—	4.2E+01	—	0.01	—	—	—	1.1E-08	1.1E-08	0.2%	—	—	—	—	—
Cobalt	11	11	5.72	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	4.7E-05	6.2E-06	—	5.3E-05	0.04%
Copper	11	11	12.4	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	1.6E-04	2.2E-05	—	1.8E-04	0.1%
Lead	11	11	239	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	11	11	262	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	5.3E-03	7.0E-04	9.2E-04	7.0E-03	5%
Mercury	11	2	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	—	—	—
Nickel	11	11	8.5	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	2.1E-04	2.7E-05	—	2.4E-04	0.2%
Selenium	11	2	—	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Silver	11	2	—	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Thallium	9	6	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	11	11	35.4	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	2.5E-03	3.3E-04	—	2.8E-03	2%
Zinc	11	11	99.2	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	1.6E-04	2.1E-05	—	1.8E-04	0.1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 6.9E-06					TOTAL HI: 0.14				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	50	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	250	d/yr
Exposure Duration (ED) =	25	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	9125	days

Dermal Contact with Soil or Sediment:

CF =	1.00E-06	kg/mg
Body Surface Area (SA) =	3300	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
ATc =	25550	days
ATnc =	9125	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	8	hr/day
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg
ATc =	25550	days
ATnc =	9125	days

Notes:

NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-29: Summary of Risks and Hazard Indices for Residential Scenario at Site 12, Units 2 and 4

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
Acetone	—	—	—	—	8.1E-07	8.1E-06	8.1E-06	0.001%
Carbon tetrachloride	4.4E-09	9.9E-09	1.4E-08	0.1%	3.4E-04	3.0E-03	3.0E-03	0.3%
Toluene	—	—	—	—	1.0E-06	8.7E-06	8.7E-06	0.001%
Benz(a)anthracene	3.4E-09	2.5E-08	2.8E-08	0.2%	6.9E-07	2.0E-05	2.0E-05	0.002%
Benzo(a)pyrene	3.6E-08	2.6E-07	3.0E-07	2%	7.2E-07	2.1E-05	2.1E-05	0.002%
Benzo(b)fluoranthene	1.8E-08	1.3E-07	1.5E-07	1%	3.6E-06	1.1E-04	1.1E-04	0.01%
Benzo(g,h,i)perylene	—	—	—	—	1.8E-06	5.3E-05	5.3E-05	0.005%
Benzo(k)fluoranthene	1.9E-10	1.4E-09	1.6E-09	0.01%	3.8E-07	1.1E-05	1.1E-05	0.001%
Bis(2-ethylhexyl)phthalate	6.0E-10	4.5E-09	5.1E-09	0.04%	6.3E-06	1.9E-04	1.9E-04	0.02%
Chrysene	4.7E-11	3.4E-10	3.9E-10	0.003%	9.4E-07	2.7E-05	2.7E-05	0.003%
Dibenz(a,h)anthracene	7.4E-08	5.3E-07	6.1E-07	4%	1.5E-06	4.3E-05	4.3E-05	0.004%
Fluoranthene	—	—	—	—	5.2E-06	1.5E-04	1.5E-04	0.01%
Indeno(1,2,3-cd)pyrene	6.4E-09	4.7E-08	5.3E-08	0.4%	1.3E-06	3.7E-05	3.7E-05	0.003%
Phenanthrene	—	—	—	—	5.6E-06	1.6E-04	1.6E-04	0.02%
Pyrene	—	—	—	—	7.0E-06	2.0E-04	2.0E-04	0.02%
4,4'-DDD	1.0E-10	8.1E-10	9.1E-10	0.01%	2.5E-06	7.9E-05	7.9E-05	0.01%
4,4'-DDE	8.3E-10	6.4E-09	7.2E-09	0.1%	1.4E-05	4.4E-04	4.4E-04	0.04%
4,4'-DDT	1.3E-09	1.0E-08	1.2E-08	0.1%	2.3E-05	7.0E-04	7.0E-04	0.1%
alpha-Chlordane	6.8E-11	5.3E-10	6.0E-10	0.004%	1.1E-06	3.5E-05	3.5E-05	0.003%
Aroclor 1254	8.2E-09	5.9E-08	6.8E-08	0.5%	5.9E-04	1.7E-02	1.7E-02	2%
Aroclor 1260	9.2E-09	6.7E-08	7.6E-08	1%	6.7E-04	2.0E-02	2.0E-02	2%
beta-BHC	2.9E-10	2.2E-09	2.5E-09	0.02%	3.6E-10	1.1E-08	1.1E-08	0.000001%
delta-BHC	—	—	—	—	2.8E-09	8.3E-08	8.3E-08	0.00001%
Dieldrin	4.9E-09	3.8E-08	4.3E-08	0.3%	1.8E-05	5.5E-04	5.5E-04	0.1%
Endosulfan I	—	—	—	—	8.2E-08	2.6E-06	2.6E-06	0.0002%
Endosulfan II	—	—	—	—	1.6E-07	4.8E-06	4.8E-06	0.0004%
Endrin	—	—	—	—	3.1E-06	9.7E-05	9.7E-05	0.01%
Endrin aldehyde	—	—	—	—	3.2E-06	9.9E-05	9.9E-05	0.01%
gamma-BHC (Lindane)	2.1E-10	—	2.1E-10	0.002%	1.6E-06	4.9E-05	4.9E-05	0.004%
gamma-Chlordane	6.8E-11	5.3E-10	6.0E-10	0.004%	1.1E-06	3.5E-05	3.5E-05	0.003%
Heptachlor	7.2E-10	5.6E-09	6.3E-09	0.05%	9.4E-07	2.9E-05	2.9E-05	0.003%
Heptachlor epoxide	2.9E-09	2.3E-08	2.6E-08	0.2%	7.2E-05	2.2E-03	2.2E-03	0.2%
2,4,5-T	—	—	—	—	3.1E-07	9.5E-06	9.5E-06	0.001%
2,4,5-TP	—	—	—	—	3.0E-07	9.3E-06	9.3E-06	0.001%
2,4-DB	—	—	—	—	4.0E-06	1.2E-04	1.2E-04	0.01%
Dicamba	—	—	—	—	3.8E-07	1.2E-05	1.2E-05	0.001%
MCPA	—	—	—	—	3.5E-03	1.1E-01	1.1E-01	10%
MCPP	—	—	—	—	1.3E-03	4.0E-02	4.0E-02	4%
Aluminum	—	—	—	—	8.6E-03	2.6E-01	2.6E-01	24%
Antimony	—	—	—	—	—	—	—	—
Arsenic	1.4E-06	1.1E-05	1.2E-05	89%	8.9E-03	2.8E-01	2.8E-01	26%
Barium	—	—	—	—	1.2E-03	3.8E-02	3.8E-02	3%
Beryllium	—	—	—	—	—	—	—	—
Cadmium	—	—	—	—	—	—	—	—
Chromium	1.6E-08	3.2E-08	4.8E-08	0.4%	—	—	—	—
Cobalt	—	—	—	—	5.7E-05	1.8E-03	1.8E-03	0.2%
Copper	—	—	—	—	1.4E-04	4.4E-03	4.4E-03	0.4%
Lead	—	—	—	—	—	—	—	—
Manganese	—	—	—	—	6.9E-03	1.9E-01	1.9E-01	17%
Mercury	—	—	—	—	—	—	—	—
Nickel	—	—	—	—	2.2E-04	7.0E-03	7.0E-03	1%
Selenium	—	—	—	—	—	—	—	—
Silver	—	—	—	—	1.2E-05	3.8E-04	3.8E-04	0.03%
Thallium	—	—	—	—	—	—	—	—
Vanadium	—	—	—	—	3.2E-03	1.0E-01	1.0E-01	9%
Zinc	—	—	—	—	1.0E-04	3.3E-03	3.3E-03	0.3%
Revised Cumulative Risk and Cumulative Hazard Index:					1.4E-05			
					1.08			

Notes:

^a - ED = Exposure Duration^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

Table C-30: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 12, Units 2 and 4

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
Acetone	8	2	0.012	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	4.7E-08	1.9E-08	7.5E-07	8.1E-07	0.002%
Carbon tetrachloride	8	1	0.006	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	1.0E-10	4.2E-11	4.3E-09	4.4E-09	0.3%	3.4E-06	1.3E-06	3.4E-04	3.4E-04	0.003%
Toluene	3	3	0.005	—	2.0E-01	—	1.1E-01	—	3.6E+03	—	—	—	—	—	9.8E-09	3.9E-09	1.0E-06	1.0E-06	0.002%
Benzo(a)anthracene	14	8	0.022	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	2.2E-09	1.3E-09	1.4E-13	3.4E-09	0.2%	4.3E-07	2.6E-07	1.5E-09	6.9E-07	0.002%
Benzo(a)pyrene	14	7	0.023	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	2.3E-08	1.3E-08	1.4E-12	3.6E-08	2%	4.5E-07	2.7E-07	1.6E-09	7.2E-07	0.002%
Benzo(b)fluoranthene	14	8	0.116	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.1E-08	6.8E-09	7.3E-13	1.8E-08	1%	2.3E-06	1.4E-06	8.0E-09	3.6E-06	0.01%
Benzo(g,h,i)perylene	14	8	0.058	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	1.1E-06	6.8E-07	4.0E-09	1.8E-06	0.01%
Benzo(k)fluoranthene	14	6	0.012	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	—	1.2E-10	7.0E-11	7.6E-15	1.9E-10	0.01%	2.3E-07	1.4E-07	8.3E-10	3.8E-07	0.001%
Bis(2-ethylhexyl)phthalate	2	2	0.23	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.1	—	4.3E-10	1.7E-10	6.5E-14	6.0E-10	0.04%	4.5E-06	1.8E-06	6.2E-10	6.3E-06	0.02%
Chrysene	14	7	0.03	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	2.9E-11	1.8E-11	1.9E-15	4.7E-11	0.003%	5.9E-07	3.5E-07	2.1E-09	9.4E-07	0.003%
Dibenz(a,h)anthracene	14	5	0.047	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	4.6E-08	2.8E-08	3.0E-12	7.4E-08	5%	9.2E-07	5.5E-07	3.2E-09	1.5E-06	0.004%
Fluoranthene	22	7	0.335	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	3.3E-06	2.0E-06	5.0E-10	5.2E-06	0.01%
Indeno(1,2,3-cd)pyrene	14	6	0.041	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	4.0E-09	2.4E-09	2.6E-13	6.4E-09	0.4%	8.0E-07	4.8E-07	2.8E-09	1.3E-06	0.004%
Phenanthrene	14	1	0.18	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	3.5E-06	2.1E-06	1.2E-08	5.6E-06	0.02%
Pyrene	22	6	0.335	—	3.0E-02	—	3.0E-02	0.15	—	—	—	—	—	—	4.4E-06	2.6E-06	6.6E-10	7.0E-06	0.02%
4,4'-DDD	84	37	0.0027	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	8.7E-11	1.7E-11	1.3E-14	1.0E-10	0.01%	2.1E-06	4.2E-07	3.2E-10	2.5E-06	0.01%
4,4'-DDE	84	44	0.0151	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	6.9E-10	1.4E-10	1.0E-13	8.3E-10	0.1%	1.2E-05	2.4E-06	1.8E-09	1.4E-05	0.04%
4,4'-DDT	84	45	0.024	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.1E-09	2.2E-10	1.7E-13	1.3E-09	0.1%	1.9E-05	3.7E-06	2.8E-09	2.3E-05	0.06%
alpha-Chlordane	83	31	0.00121	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	5.7E-11	1.1E-11	8.6E-15	6.8E-11	0.004%	9.5E-07	1.9E-07	3.6E-10	1.1E-06	0.003%
Aroclor 1254	81	11	0.0195	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	5.2E-09	2.9E-09	7.9E-13	8.2E-09	1%	3.8E-04	2.1E-04	5.8E-08	5.9E-04	2%
Aroclor 1260	82	27	0.022	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	5.9E-09	3.3E-09	8.9E-13	9.2E-09	1%	4.3E-04	2.4E-04	6.5E-08	6.7E-04	2%
beta-BHC	75	6	0.001	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.05	—	2.4E-10	4.8E-11	3.7E-14	2.9E-10	0.02%	3.0E-10	6.0E-11	4.6E-14	3.6E-10	0.000001%
delta-BHC	80	3	0.0066	—	1.3E+00	—	1.3E+00	0.1	—	—	—	—	—	—	2.0E-09	7.9E-10	3.0E-13	2.8E-09	0.00001%
Dieldrin	78	6	0.0019	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	4.1E-09	8.1E-10	6.2E-13	4.9E-09	0.3%	1.5E-05	3.0E-06	2.3E-09	1.8E-05	0.0002%
Endosulfan I	82	8	0.00105	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	6.8E-08	1.4E-08	1.0E-11	8.2E-08	0.0004%
Endosulfan II	80	13	0.00199	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.3E-07	2.6E-08	2.0E-11	1.6E-07	0.0004%
Endrin	82	13	0.002	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	2.6E-06	5.2E-07	3.9E-10	3.1E-06	0.009%
Endrin aldehyde	78	14	0.00204	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	2.7E-06	5.3E-07	4.0E-10	3.2E-06	0.009%
gamma-BHC (Lindane)	45	1	0.001	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	—	1.7E-10	3.5E-11	2.6E-14	2.1E-10	0.01%	1.3E-06	2.6E-07	2.0E-10	1.6E-06	0.004%
gamma-Chlordane	83	30	0.00121	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	5.7E-11	1.1E-11	8.6E-15	6.8E-11	0.004%	9.5E-07	1.9E-07	3.6E-10	1.1E-06	0.003%
Heptachlor	80	6	0.001	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	—	6.0E-10	1.2E-10	9.2E-14	7.2E-10	0.05%	7.8E-07	1.6E-07	1.2E-10	9.4E-07	0.003%
Heptachlor epoxide	72	2	0.002	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	—	2.4E-09	4.9E-10	3.7E-13	2.9E-09	0.2%	6.0E-05	1.2E-05	9.1E-09	7.2E-05	0.2%
2,4,5-T	17	2	0.0065	—	1.0E-02	—	1.0E-02	0.05	—	—	—	—	—	—	2.5E-07	5.1E-08	3.9E-11	3.1E-07	0.001%
2,4,5-TP	30	1	0.0051	—	8.0E-03	—	8.0E-03	0.05	—	—	—	—	—	—	2.5E-07	5.0E-08	3.8E-11	3.0E-07	0.001%
2,4-DB	55	3	0.068	—	8.0E-03	—	8.0E-03	0.05	—	—	—	—	—	—	3.3E-06	6.6E-07	5.0E-10	4.0E-06	0.01%
Dicamba	48	2	7.5	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	3.1E-07	6.2E-08	4.7E-11	3.8E-07	0.001%
MCPA	48	2	7.5	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	2.9E-03	5.9E-04	4.4E-07	3.5E-03	10%
MCPP	55	5	2.75	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	1.1E-03	2.1E-04	1.6E-07	1.3E-03	4%
Aluminum	76	76	19200	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	7.5E-03	3.0E-04	8.1E-04	8.6E-03	24%
Antimony	22	6	—	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Arsenic	76	69	6.07	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	1.2E-06	1.5E-07	1.9E-09	1.4E-06	88%	7.9E-03	9.5E-04	—	8.9E-03	25%
Barium	76	76	197	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	1.1E-03	4.4E-05	8.2E-05	1.2E-03	3%
Beryllium	76	66	0.48	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	76	64	—	—	5.0E-04	6.3E+00	—	0.001	—	—	—	—	—	—	—	—	—	—	—
Chromium	76	76	18.4	—	—	4.2E+01	—	0.01	—	—	—	1.6E-08	1.6E-08	1%	—	—	—	—	—
Cobalt	76	76	8.43	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	5.5E-05	2.2E-06	—	5.7E-05	0%
Copper	76	76	12.5	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	1.3E-04	5.3E-06	—	1.4E-04	0%
Lead	76	76	6.67	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	76	76	324	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	5.3E-03	2.1E-04	1.4E-03	6.9E-03	19%
Mercury	76	18	0.025	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	1.7E-08	—	—
Nickel	76	75	10.7	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	2.1E-04	8.4E-06	—	2.2E-04	1%
Selenium	76	20	0.323	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Silver	76	16	0.143	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	1.1E-05	4.5E-07	—	1.2E-05	0%
Thallium	76	10	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	76	76	54.5	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	3.0E-03	1.2E-04	—	3.2E-03	9%
Zinc	76	76	75.8	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	9.9E-05	3.9E-06	—	1.0E-04	0%

Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report^(a):

TOTAL RISK: 1.6E-06

TOTAL HI: 0.04

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	100	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	100	d/yr
Exposure Duration (ED) =	24	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	8760	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	5700	cm ² /event
Soil Adherence Factor (AF) =	0.07	mg/cm ²
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
ATc =	25550	days
ATnc =	8760	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	8760	days

Notes:

NA = Not available or not applicable
 — = Information not available or not applicable
 HI = Hazard index
 HQ = Hazard quotient
 mg/kg = Milligrams per kilogram
 ABS = Dermal absorption factor (unitless)
 VF = Soil-to-air volatilization factor (m³/kg)
 EPC = Exposure point concentration

^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
 CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
 RfDo = Oral reference dose (mg/kg-day)
 RfDi = Inhalation reference dose (mg/kg-day)
 VOC = Volatile organic chemical

Table C-31: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 12, Units 2 and 4

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
Acetone	8	2	0.012	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	1.5E-06	4.3E-07	6.2E-06	8.1E-06	0.001%
Carbon tetrachloride	8	1	0.006	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	8.5E-10	2.4E-10	8.9E-09	9.9E-09	0.1%	1.1E-04	3.1E-05	2.8E-03	3.0E-03	0.3%
Toluene	3	3	0.005	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	3.2E-07	8.9E-08	8.2E-06	8.7E-06	0.001%
Benz(a)anthracene	14	8	0.022	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.8E-08	7.4E-09	2.9E-13	2.5E-08	0.2%	1.4E-05	5.9E-06	1.3E-08	2.0E-05	0.002%
Benzo(a)pyrene	14	7	0.023	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	1.8E-07	7.7E-08	3.0E-12	2.6E-07	2%	1.5E-05	6.2E-06	1.3E-08	2.1E-05	0.002%
Benzo(b)fluoranthene	14	8	0.116	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	9.3E-08	3.9E-08	1.5E-12	1.3E-07	1%	7.4E-05	3.1E-05	6.6E-08	1.1E-04	0.01%
Benzo(g,h,i)perylene	14	8	0.058	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	3.7E-05	1.6E-05	3.3E-08	5.3E-05	0.005%
Benzo(k)fluoranthene	14	6	0.012	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	—	9.6E-10	4.0E-10	1.6E-14	1.4E-09	0.01%	7.7E-06	3.2E-06	6.8E-09	1.1E-05	0.001%
Bis(2-ethylhexyl)phthalate	2	2	0.23	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.1	—	3.5E-09	9.9E-10	1.4E-13	4.5E-09	0.04%	1.5E-04	4.1E-05	5.1E-09	1.9E-04	0.02%
Chrysene	14	7	0.03	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	2.4E-10	1.0E-10	3.9E-15	3.4E-10	0.003%	1.9E-05	8.1E-06	1.7E-08	2.7E-05	0.003%
Dibenz(a,h)anthracene	14	5	0.047	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	3.8E-07	1.6E-07	6.1E-12	5.3E-07	4%	3.0E-05	1.3E-05	2.7E-08	4.3E-05	0.004%
Fluoranthene	22	7	0.335	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	1.1E-04	4.5E-05	4.1E-09	1.5E-04	0.01%
Indeno(1,2,3-cd)pyrene	14	6	0.041	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	3.3E-08	1.4E-08	5.3E-13	4.7E-08	0.4%	2.6E-05	1.1E-05	2.3E-08	3.7E-05	0.003%
Phenanthrene	14	1	0.18	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	1.2E-04	4.8E-05	1.0E-07	1.6E-04	0.02%
Pyrene	22	6	0.335	—	3.0E-02	—	3.0E-02	0.15	—	—	—	—	—	—	1.4E-04	6.0E-05	5.5E-09	2.0E-04	0.02%
4,4'-DDD	84	37	0.0027	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	7.1E-10	9.9E-11	2.7E-14	8.1E-10	0.01%	6.9E-05	9.7E-06	2.6E-09	7.9E-05	0.01%
4,4'-DDE	84	44	0.0151	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	5.6E-09	7.9E-10	2.2E-13	6.4E-09	0.1%	3.9E-04	5.4E-05	1.5E-08	4.4E-04	0.04%
4,4'-DDT	84	45	0.024	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	8.9E-09	1.3E-09	3.4E-13	1.0E-08	0.1%	6.1E-04	8.6E-05	2.4E-08	7.0E-04	0.06%
alpha-Chlordane	83	31	0.00121	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	4.6E-10	6.5E-11	1.8E-14	5.3E-10	0.00%	3.1E-05	4.3E-06	3.0E-09	3.5E-05	0.003%
Aroclor 1254	81	11	0.0195	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	4.3E-08	1.7E-08	1.6E-12	5.9E-08	0.5%	1.2E-02	4.9E-03	4.8E-07	1.7E-02	2%
Aroclor 1260	82	27	0.022	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	4.8E-08	1.9E-08	1.8E-12	6.7E-08	1%	1.4E-02	5.5E-03	5.4E-07	2.0E-02	2%
beta-BHC	75	6	0.001	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.05	—	2.0E-09	2.8E-10	7.6E-14	2.2E-09	0.02%	9.8E-09	1.4E-09	3.8E-13	1.1E-08	0.000001%
delta-BHC	80	3	0.0066	—	1.3E+00	—	1.3E+00	0.1	—	—	—	—	—	—	6.5E-08	1.8E-08	2.5E-12	8.3E-08	0.00001%
Dieldrin	78	6	0.0019	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	3.3E-08	4.7E-09	1.3E-12	3.8E-08	0.3%	4.9E-04	6.8E-05	1.9E-08	5.5E-04	0.1%
Endosulfan I	82	8	0.00105	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	2.2E-06	3.1E-07	8.6E-11	2.6E-06	0.0002%
Endosulfan II	80	13	0.00199	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	4.2E-06	5.9E-07	1.6E-10	4.8E-06	0.0004%
Endrin	82	13	0.002	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	8.5E-05	1.2E-05	3.3E-09	9.7E-05	0.01%
Endrin aldehyde	78	14	0.00204	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	8.7E-05	1.2E-05	3.3E-09	9.9E-05	0.01%
gamma-BHC (Lindane)	45	1	0.001	1.3E+00	3.0E-04	1.3E+00	3.0E-04	0.05	—	1.4E-09	2.0E-10	5.5E-14	1.6E-09	0.01%	4.3E-05	6.0E-06	1.6E-09	4.9E-05	0.004%
gamma-Chlordane	83	30	0.00121	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	4.6E-10	6.5E-11	1.8E-14	5.3E-10	0.004%	3.1E-05	4.3E-06	3.0E-09	3.5E-05	0.003%
Heptachlor	80	6	0.001	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	—	4.9E-09	6.9E-10	1.9E-13	5.6E-09	0.05%	2.6E-05	3.6E-06	9.8E-10	2.9E-05	0.003%
Heptachlor epoxide	72	2	0.002	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	—	2.0E-08	2.8E-09	7.6E-13	2.3E-08	0.2%	2.0E-03	2.8E-04	7.5E-08	2.2E-03	0.21%
2,4,5-T	17	2	0.0065	—	1.0E-02	—	1.0E-02	0.05	—	—	—	—	—	—	8.3E-06	1.2E-06	3.2E-10	9.5E-06	0.001%
2,4,5-TP	30	1	0.0051	—	8.0E-03	—	8.0E-03	0.05	—	—	—	—	—	—	8.2E-06	1.1E-06	3.1E-10	9.3E-06	0.001%
2,4-DB	55	3	0.068	—	8.0E-03	—	8.0E-03	0.05	—	—	—	—	—	—	1.1E-04	1.5E-05	4.2E-09	1.2E-04	0.01%
Dicamba	48	2	0.024	—	3.0E-02	—	3.0E-02	0.05	—	—	—	—	—	—	1.0E-05	1.4E-06	3.9E-10	1.2E-05	0.001%
MCPA	48	2	7.5	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	9.6E-02	1.3E-02	3.7E-06	1.1E-01	10%
MCPP	55	5	2.75	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	3.5E-02	4.9E-03	1.3E-06	4.0E-02	4%
Aluminum	76	76	19200	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	2.5E-01	6.9E-03	6.7E-03	2.6E-01	24%
Antimony	22	6	—	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Arsenic	76	69	6.07	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	1.0E-05	8.4E-07	3.8E-09	1.1E-05	90%	2.6E-01	2.2E-02	—	2.8E-01	26%
Barium	76	76	197	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	3.6E-02	1.0E-03	6.8E-04	3.8E-02	3%
Beryllium	76	66	0.48	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	76	64	—	—	5.0E-04	6.3E+00	—	0.001	—	—	—	—	—	—	—	—	—	—	—
Chromium	76	76	18.4	—	—	4.2E+01	—	0.01	—	—	—	3.2E-08	3.2E-08	0.3%	—	—	—	—	—
Cobalt	76	76	8.43	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	1.8E-03	5.0E-05	—	1.8E-03	0.2%
Copper	76	76	12.5	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	4.3E-03	1.2E-04	—	4.4E-03	0.4%
Lead	76	76	6.67	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	76	76	324	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	1.7E-01	4.8E-03	1.1E-02	1.9E-01	17%
Mercury	76	18	0.025	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	1.4E-07	—	—
Nickel	76	75	10.7	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	6.8E-03	1.9E-04	—	7.0E-03	1%
Selenium	76	20	0.323	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Silver	76	16	0.143	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	3.7E-04	1.0E-05	—	3.8E-04	0.03%
Thallium	76	10	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	76	76	54.5	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	1.0E-01	2.8E-03	—	1.0E-01	9%
Zinc	76	76	75.8	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	3.2E-03	9.0E-05	—	3.3E-03	0.3%

Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report^(a):

TOTAL RISK: 1.2E-05

TOTAL HI: 1.08

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	200	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	350	d/yr
Exposure Duration (ED) =	6	yr
Body Weight (BW) =	15	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	2190	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	2800	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
ATc =	25550	days
ATnc =	2190	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.42	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	2190	days

Notes:

NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)

EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Table C-32: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 12, Units 2 and 4

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
Acetone	5	2	0.012	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	5.9E-08	7.7E-08	6.2E-07	7.6E-07	0.002%
Carbon tetrachloride	6	1	0.006	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	1.4E-10	1.8E-10	3.7E-09	4.0E-09	0.1%	4.2E-06	5.5E-06	2.8E-04	2.9E-04	1%
Toluene	3	3	0.005	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	1.2E-08	1.6E-08	8.3E-07	8.6E-07	0.002%
Benz(a)anthracene	7	7	0.3	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	3.8E-08	7.6E-08	1.6E-12	1.1E-07	3%	7.3E-06	1.5E-05	1.7E-08	2.2E-05	0.04%
Benzo(a)pyrene	7	6	0.082	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	1.0E-07	2.1E-07	4.5E-12	3.1E-07	9%	2.0E-06	4.0E-06	4.7E-09	6.0E-06	0.01%
Benzo(b)fluoranthene	7	7	0.199	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	2.5E-08	5.0E-08	1.1E-12	7.6E-08	2%	4.9E-06	9.6E-06	1.1E-08	1.5E-05	0.03%
Benzo(g,h,i)perylene	7	7	0.25	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	6.1E-06	1.2E-05	1.4E-08	1.8E-05	0.04%
Benzo(k)fluoranthene	7	6	0.12	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	—	1.5E-09	3.0E-09	6.6E-14	4.6E-09	0.1%	2.9E-06	5.8E-06	6.9E-09	8.8E-06	0.02%
Bis(2-ethylhexyl)phthalate	2	2	0.23	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.1	—	5.6E-10	7.4E-10	5.7E-14	1.3E-09	0.04%	5.6E-06	7.4E-06	5.2E-10	1.3E-05	0.03%
Chrysene	7	6	0.27	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	3.4E-10	6.8E-10	1.5E-14	1.0E-09	0.03%	6.6E-06	1.3E-05	1.5E-08	2.0E-05	0.04%
Dibenz(a,h)anthracene	7	5	0.19	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	2.4E-07	4.8E-07	1.0E-11	7.2E-07	21%	4.6E-06	9.2E-06	1.1E-08	1.4E-05	0.03%
Fluoranthene	13	7	0.34	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	4.2E-06	8.2E-06	4.2E-10	1.2E-05	0.03%
Indeno(1,2,3-cd)pyrene	7	6	0.2	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	2.6E-08	5.1E-08	1.1E-12	7.6E-08	2%	4.9E-06	9.7E-06	1.1E-08	1.5E-05	0.03%
Phenanthrene	7	1	0.18	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	4.4E-06	8.7E-06	1.0E-08	1.3E-05	0.03%
Pyrene	13	6	0.34	—	3.0E-02	—	3.0E-02	0.15	—	—	—	—	—	—	5.5E-06	1.1E-05	5.6E-10	1.7E-05	0.03%
4,4'-DDD	42	33	0.0118	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	4.9E-10	3.3E-10	5.0E-14	8.2E-10	0.02%	1.2E-05	7.6E-06	1.2E-09	1.9E-05	0.04%
4,4'-DDE	42	39	0.356	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	2.1E-08	1.4E-08	2.1E-12	3.5E-08	1%	3.5E-04	2.3E-04	3.5E-08	5.8E-04	1%
4,4'-DDT	42	40	0.421	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	2.5E-08	1.7E-08	2.5E-12	4.2E-08	1%	4.1E-04	2.7E-04	4.2E-08	6.8E-04	1%
alpha-Chlordane	41	27	0.0034	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	2.1E-10	1.4E-10	2.1E-14	3.5E-10	0.01%	3.3E-06	2.2E-06	8.4E-10	5.5E-06	0.01%
Aroclor 1254	39	11	0.0366	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	1.3E-08	2.4E-08	1.3E-12	3.6E-08	1%	9.0E-04	1.7E-03	9.0E-08	2.5E-03	5%
Aroclor 1260	40	25	0.0715	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	2.5E-08	4.6E-08	2.5E-12	7.1E-08	2%	1.7E-03	3.2E-03	1.8E-07	5.0E-03	10%
beta-BHC	34	1	0.0044	1.8E+00	1.3E+00	1.8E+00	1.3E+00	0.05	—	1.4E-09	9.1E-10	1.4E-13	2.3E-09	0.1%	1.7E-09	1.1E-09	1.7E-13	2.7E-09	0.00001%
delta-BHC	38	1	0.0066	—	1.3E+00	—	1.3E+00	0.1	—	—	—	—	—	—	2.5E-09	3.3E-09	2.5E-13	5.8E-09	0.00001%
Dieldrin	37	6	0.00195	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	5.5E-09	3.6E-09	5.5E-13	9.1E-09	0.3%	1.9E-05	1.3E-05	1.9E-09	3.2E-05	0.1%
Endosulfan I	40	8	0.0019	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.5E-07	1.0E-07	1.6E-11	2.6E-07	0.001%
Endosulfan II	38	9	0.0022	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.8E-07	1.2E-07	1.8E-11	3.0E-07	0.001%
Endrin	40	12	0.0033	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	5.4E-06	3.6E-06	5.4E-10	8.9E-06	0.02%
Endrin aldehyde	38	14	0.00344	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	5.6E-06	3.7E-06	5.7E-10	9.3E-06	0.02%
gamma-Chlordane	41	26	0.00399	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	2.4E-10	1.6E-10	2.5E-14	4.1E-10	0.01%	3.9E-06	2.6E-06	9.8E-10	6.5E-06	0.01%
Heptachlor	38	1	0.0059	4.5E+00	5.0E-04	4.6E+00	5.0E-04	0.05	—	4.6E-09	3.1E-09	4.7E-13	7.7E-09	0.2%	5.8E-06	3.8E-06	5.8E-10	9.6E-06	0.02%
Heptachlor epoxide	31	2	0.002	9.1E+00	1.3E-05	9.1E+00	1.3E-05	0.05	—	3.2E-09	2.1E-09	3.2E-13	5.3E-09	0.2%	7.5E-05	5.0E-05	7.6E-09	1.2E-04	0.3%
2,4,5-T	8	1	0.0046	—	1.0E-02	—	1.0E-02	0.05	—	—	—	—	—	—	2.3E-07	1.5E-07	2.3E-11	3.7E-07	0.001%
2,4,5-TP	14	1	0.0051	—	8.0E-03	—	8.0E-03	0.05	—	—	—	—	—	—	3.1E-07	2.1E-07	3.1E-11	5.2E-07	0.001%
2,4-DB	30	2	0.064	—	8.0E-03	—	8.0E-03	0.05	—	—	—	—	—	—	3.9E-06	2.6E-06	3.9E-10	6.5E-06	0.01%
Dicamba	24	1	0.0087	—	3.0E-02	—	3.0E-02	0.05	—	—	—	—	—	—	1.4E-07	9.4E-08	1.4E-11	2.4E-07	0.0005%
MCPA	24	2	7.5	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	3.7E-03	2.4E-03	3.7E-07	6.1E-03	12%
MCPP	30	4	2.8	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	1.4E-03	9.0E-04	1.4E-07	2.3E-03	5%
Aluminum	37	37	13700	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	6.7E-03	8.8E-04	4.8E-04	8.1E-03	16%
Antimony	6	2	—	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Arsenic	37	34	5.1	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	1.3E-06	5.3E-07	1.4E-09	1.9E-06	55%	8.3E-03	3.3E-03	—	1.2E-02	23%
Barium	37	37	134	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	9.4E-04	1.2E-04	4.6E-05	1.1E-03	2%
Beryllium	37	28	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	37	32	—	—	5.0E-04	6.3E+00	—	0.001	—	—	—	—	—	—	—	—	—	—	—
Chromium	37	37	14.6	—	—	4.2E+01	—	0.01	—	—	—	1.1E-08	1.1E-08	0.3%	—	—	—	—	—
Cobalt	37	37	6.76	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	5.5E-05	7.3E-06	—	6.2E-05	0.1%
Copper	37	37	12.3	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	1.6E-04	2.1E-05	—	1.8E-04	0.4%
Lead	37	37	19.3	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	37	37	264	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	5.4E-03	7.1E-04	9.3E-04	7.0E-03	14%
Mercury	37	15	0.08	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	—	—	—
Nickel	37	37	9.9	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	2.4E-04	3.2E-05	—	2.7E-04	1%
Selenium	37	13	0.33	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Silver	37	12	0.235	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Thallium	37	4	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	37	37	39.9	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	2.8E-03	3.7E-04	—	3.2E-03	6%
Zinc	37	37	62.1	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	1.0E-04	1.3E-05	—	1.1E-04	0.2%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 3.4E-06					TOTAL HI: 0.05				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	50	mg/d
Conversion Factor (CF) =	1.0E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	250	d/yr
Exposure Duration (ED) =	25	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	9125	days

Dermal Contact with Soil or Sediment:

CF =	1.00E-06	kg/mg
Body Surface Area (SA) =	3300	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
ATc =	25550	days
ATnc =	9125	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	8	hr/day
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg
ATc =	25550	days
ATnc =	9125	days

Notes:

NA = Not available or not applicable
-- = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.

Table C-33: Summary of Risks and Hazard Indices for Residential Scenario at Site 12, Unit 3

Chemical	Total Risk Adult (ED ^a = 24 Years)	Total Risk Child (ED = 6 Years)	Total Risk Hypothetical ^b Adult Resident (ED = 30 Years)	% Contribution to Risk	Total HQ Adult	Total HQ Child	Applicable HQ ^c	% Contribution to HI
Acetone	--	--	--	--	2.0E-06	2.0E-05	2.0E-05	0.001%
Carbon disulfide	--	--	--	--	6.7E-07	5.7E-06	5.7E-06	0.0002%
Carbon tetrachloride	8.1E-09	1.8E-08	2.6E-08	0.1%	6.3E-04	5.4E-03	5.4E-03	0.2%
Methylene chloride	4.7E-10	1.2E-09	1.6E-09	0.01%	1.1E-06	1.4E-05	1.4E-05	0.0004%
Toluene	--	--	--	--	1.5E-06	1.3E-05	1.3E-05	0.0004%
Xylenes	--	--	--	--	1.8E-07	1.5E-06	1.5E-06	0.00004%
Benz(a)anthracene	6.6E-09	4.8E-08	5.4E-08	0.3%	1.3E-06	3.8E-05	3.8E-05	0.001%
Benzo(a)pyrene	3.3E-07	2.4E-06	2.7E-06	13%	6.6E-06	1.9E-04	1.9E-04	0.01%
Benzo(b)fluoranthene	1.5E-07	1.1E-06	1.2E-06	6%	2.9E-05	8.4E-04	8.4E-04	0.03%
Benzo(g,h,i)perylene	--	--	--	--	1.8E-06	5.4E-05	5.4E-05	0.002%
Benzo(k)fluoranthene	5.6E-09	4.1E-08	4.7E-08	0.2%	1.1E-05	3.3E-04	3.3E-04	0.01%
Bis(2-ethylhexyl)phthalate	1.6E-09	1.2E-08	1.3E-08	0.1%	1.6E-05	4.9E-04	4.9E-04	0.01%
Chrysene	5.8E-10	4.2E-09	4.8E-09	0.02%	1.2E-05	3.4E-04	3.4E-04	0.01%
Dibenz(a,h)anthracene	3.4E-07	2.5E-06	2.8E-06	14%	6.9E-06	2.0E-04	2.0E-04	0.01%
Fluoranthene	--	--	--	--	5.8E-06	1.7E-04	1.7E-04	0.01%
Indeno(1,2,3-cd)pyrene	2.8E-08	2.0E-07	2.3E-07	1%	5.6E-06	1.6E-04	1.6E-04	0.005%
Phenanthrene	--	--	--	--	1.8E-05	5.4E-04	5.4E-04	0.02%
Pyrene	--	--	--	--	8.5E-06	2.5E-04	2.5E-04	0.01%
4,4'-DDD	1.1E-08	8.7E-08	9.8E-08	0.5%	2.7E-04	8.5E-03	8.5E-03	0.3%
4,4'-DDE	3.8E-08	3.0E-07	3.3E-07	2%	6.5E-04	2.0E-02	2.0E-02	1%
4,4'-DDT	2.0E-07	1.6E-06	1.8E-06	9%	3.4E-03	1.1E-01	1.1E-01	3%
alpha-Chlordane	1.2E-10	9.7E-10	1.1E-09	0.01%	2.1E-06	6.4E-05	6.4E-05	0.002%
Aroclor 1254	2.0E-08	1.5E-07	1.7E-07	1%	1.5E-03	4.2E-02	4.2E-02	1%
Aroclor 1260	3.6E-08	2.6E-07	2.9E-07	1%	2.6E-03	7.6E-02	7.6E-02	2%
Dieldrin	2.7E-07	2.1E-06	2.3E-06	11%	9.8E-04	3.0E-02	3.0E-02	1%
Endosulfan I	--	--	--	--	1.7E-06	5.3E-05	5.3E-05	0.002%
Endosulfan II	--	--	--	--	1.3E-06	3.9E-05	3.9E-05	0.001%
Endrin	--	--	--	--	8.0E-05	2.5E-03	2.5E-03	0.1%
Endrin aldehyde	--	--	--	--	4.1E-05	1.3E-03	1.3E-03	0.04%
Endrin ketone	--	--	--	--	2.1E-04	6.5E-03	6.5E-03	0.2%
gamma-Chlordane	1.9E-10	1.4E-09	1.6E-09	0.01%	3.1E-06	9.6E-05	9.6E-05	0.003%
Methoxychlor	--	--	--	--	1.6E-05	5.1E-04	5.1E-04	0.02%
Dalapon	--	--	--	--	1.1E-06	3.4E-05	3.4E-05	0.001%
2,4-D	--	--	--	--	8.6E-06	2.0E-04	2.0E-04	0.01%
MCPP	--	--	--	--	7.2E-02	2.2E+00	2.2E+00	67%
Aluminum	--	--	--	--	8.6E-03	2.6E-01	2.6E-01	8%
Antimony	--	--	--	--	--	--	--	--
Arsenic	9.4E-07	7.5E-06	8.4E-06	41%	6.1E-03	1.9E-01	1.9E-01	6%
Barium	--	--	--	--	1.2E-03	3.8E-02	3.8E-02	1%
Beryllium	--	--	--	--	--	--	--	--
Cadmium	--	--	--	--	--	--	--	--
Chromium	1.7E-08	3.4E-08	5.1E-08	0.2%	--	--	--	--
Cobalt	--	--	--	--	5.9E-05	1.9E-03	1.9E-03	0.1%
Copper	--	--	--	--	2.0E-04	6.5E-03	6.5E-03	0.2%
Lead	--	--	--	--	--	--	--	--
Manganese	--	--	--	--	6.5E-03	1.8E-01	1.8E-01	5%
Mercury	--	--	--	--	--	--	--	--
Nickel	--	--	--	--	2.5E-04	8.1E-03	8.1E-03	0.2%
Selenium	--	--	--	--	--	--	--	--
Silver	--	--	--	--	2.9E-05	9.2E-04	9.2E-04	0.03%
Thallium	--	--	--	--	--	--	--	--
Vanadium	--	--	--	--	3.0E-03	9.6E-02	9.6E-02	3%
Zinc	--	--	--	--	2.0E-04	6.4E-03	6.4E-03	0.2%
Revised Cumulative Risk and Cumulative Hazard Index:	2.1E-05				3.32			

Notes:

^a - ED = Exposure Duration^b - Hypothetical Resident Adult risks were calculated by combining the Resident Child for an ED of 6 years and Resident Adult for an ED of 24 years, consistent with the Remedial Investigation risk assessment approach.^c - Applicable HQ = The Adult HQ or Child HQ, whichever is higher, selected consistent with the Remedial Investigation risk assessment approach.

Shading indicates additional data was collected during May 1999.

Table C-34: Risks and Hazard Indices for Adult Residents Exposed to Shallow Soil (0-10 feet) at Site 12, Unit 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
Acetone	10	7	0.0299	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	1.2E-07	4.7E-08	1.9E-06	2.0E-06	0.002%
Carbon disulfide	1	1	0.002	—	1.0E-01	—	2.0E-01	0.1	1.2E+03	—	—	—	—	—	7.8E-09	3.1E-09	6.6E-07	6.7E-07	0.001%
Carbon tetrachloride	10	3	0.011	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	1.9E-10	7.7E-11	7.9E-09	8.1E-09	0.3%	6.2E-06	2.5E-06	6.2E-04	6.3E-04	1%
Methylene chloride	10	1	0.024	7.5E-03	6.0E-02	1.6E-03	8.6E-01	0.1	2.4E+03	2.4E-11	9.6E-12	4.4E-10	4.7E-10	0.02%	1.6E-07	6.2E-08	9.0E-07	1.1E-06	0.001%
Toluene	10	4	0.0075	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	1.5E-08	5.9E-09	1.5E-06	1.5E-06	0.001%
Xylenes	1	1	0.002	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	3.9E-10	1.6E-10	1.8E-07	1.8E-07	0.0002%
Benz(a)anthracene	5	2	0.042	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	4.1E-09	2.5E-09	2.6E-13	6.6E-09	0.3%	8.2E-07	4.9E-07	2.9E-09	1.3E-06	0.001%
Benzo(a)pyrene	7	5	0.21	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	2.1E-07	1.2E-07	1.3E-11	3.3E-07	14%	4.1E-06	2.5E-06	1.4E-08	6.6E-06	0.01%
Benzo(b)fluoranthene	14	3	0.93	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	9.1E-08	5.5E-08	5.9E-12	1.5E-07	6%	1.8E-05	1.1E-05	6.4E-08	2.9E-05	0.03%
Benzo(g,h,i)perylene	5	2	0.059	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	1.2E-06	6.9E-07	4.1E-09	1.8E-06	0.002%
Benzo(k)fluoranthene	13	4	0.36	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	—	3.5E-09	2.1E-09	2.3E-13	5.6E-09	0.2%	7.0E-06	4.2E-06	2.5E-08	1.1E-05	0.01%
Bis(2-ethylhexyl)phthalate	9	2	0.6	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.1	—	1.1E-09	4.5E-10	1.7E-13	1.6E-09	0.1%	1.2E-05	4.7E-06	1.6E-09	1.6E-05	0.02%
Chrysene	14	4	0.37	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	3.6E-10	2.2E-10	2.3E-14	5.8E-10	0.02%	7.2E-06	4.3E-06	2.5E-08	1.2E-05	0.01%
Dibenz(a,h)anthracene	6	4	0.22	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	2.2E-07	1.3E-07	1.4E-11	3.4E-07	14%	4.3E-06	2.6E-06	1.5E-08	6.9E-06	0.01%
Fluoranthene	14	4	0.37	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	3.6E-06	2.2E-06	5.5E-10	5.8E-06	0.01%
Indeno(1,2,3-cd)pyrene	7	5	0.18	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.8E-08	1.1E-08	1.1E-12	2.8E-08	1%	3.5E-06	2.1E-06	1.2E-08	5.6E-06	0.01%
Phenanthrene	13	2	0.59	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	1.2E-05	6.9E-06	4.1E-08	1.8E-05	0.02%
Pyrene	14	4	0.409	—	3.0E-02	—	3.0E-02	0.15	—	—	—	—	—	—	5.3E-06	3.2E-06	8.1E-10	8.5E-06	0.01%
4,4'-DDD	27	21	0.29057	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	9.4E-09	1.9E-09	1.4E-12	1.1E-08	0.5%	2.3E-04	4.5E-05	3.4E-08	2.7E-04	0.3%
4,4'-DDE	27	21	0.69481	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	3.2E-08	6.3E-09	4.8E-12	3.8E-08	2%	5.4E-04	1.1E-04	8.2E-08	6.5E-04	1%
4,4'-DDT	28	24	3.65	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.7E-07	3.3E-08	2.5E-11	2.0E-07	8%	2.9E-03	5.7E-04	4.3E-07	3.4E-03	3%
alpha-Chlordane	18	5	0.00221	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	1.0E-10	2.1E-11	1.6E-14	1.2E-10	0.01%	1.7E-06	3.5E-07	6.5E-10	2.1E-06	0.002%
Aroclor 1254	20	4	0.0477	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	1.3E-08	7.2E-09	1.9E-12	2.0E-08	1%	9.3E-04	5.2E-04	1.4E-07	1.5E-03	1%
Aroclor 1260	16	5	0.085	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	2.3E-08	1.3E-08	3.5E-12	3.6E-08	1%	1.7E-03	9.3E-04	2.5E-07	2.6E-03	2%
Dieldrin	6	5	0.104	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	2.2E-07	4.5E-08	3.4E-11	2.7E-07	11%	8.1E-04	1.6E-04	1.2E-07	9.8E-04	1%
Endosulfan I	4	2	0.022	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.4E-06	2.9E-07	2.2E-10	1.7E-06	0.002%
Endosulfan II	15	2	0.016	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	6.7E-06	1.3E-05	1.0E-08	8.0E-05	0.1%
Endrin	4	3	0.051	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	3.4E-05	6.8E-06	5.2E-09	4.1E-05	0.04%
Endrin aldehyde	21	9	0.0263	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	1.7E-04	3.5E-05	2.6E-08	2.1E-04	0.2%
Endrin ketone	17	2	0.133	—	3.0E-04	—	3.0E-04	0.05	—	1.5E-10	3.1E-11	2.3E-14	1.9E-10	0.01%	2.6E-06	5.2E-07	9.8E-10	3.1E-06	0.003%
gamma-Chlordane	17	6	0.0033	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	—	—	—	—	—	1.4E-05	2.7E-06	2.1E-09	1.6E-05	0.02%
Methoxychlor	5	5	0.175	—	5.0E-03	—	5.0E-03	0.05	—	—	—	—	—	—	9.1E-07	1.8E-07	1.4E-10	1.1E-06	0.001%
Dalapon	24	4	0.07	—	3.0E-02	—	3.0E-02	0.05	—	—	—	—	—	—	5.5E-06	1.1E-06	8.3E-10	6.6E-06	0.01%
2,4-D	14	1	0.14	—	1.0E-02	—	1.0E-02	0.05	—	—	—	—	—	—	6.0E-02	1.2E-02	9.1E-06	7.2E-02	66%
MCCPP	25	1	153	—	1.0E-03	—	1.0E-03	0.01	—	—	—	—	—	—	7.5E-03	3.0E-04	8.1E-04	8.6E-03	8%
Aluminum	25	25	19100	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	—	—	—	—	—
Antimony	14	10	0.5	—	4.0E-04	—	—	0.01	—	8.4E-07	1.0E-07	1.3E-09	9.4E-07	39%	5.5E-03	6.5E-04	—	6.1E-03	6%
Arsenic	25	23	4.18	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	—	—	—	—	—	1.1E-03	4.4E-05	8.2E-05	1.2E-03	1%
Barium	25	25	197	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	—	—	—	—	—
Beryllium	25	6	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	25	25	2.22	—	5.0E-04	6.3E+00	—	0.001	—	—	—	1.7E-08	1.7E-08	1%	—	—	—	—	—
Chromium	25	25	19.5	—	—	4.2E+01	—	0.01	—	—	—	—	—	—	5.7E-05	2.3E-06	—	5.9E-05	0.1%
Cobalt	25	25	8.76	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	1.9E-04	7.7E-06	—	2.0E-04	0.2%
Copper	25	25	18.3	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Lead	25	25	195	—	—	—	—	0.01	—	—	—	—	—	—	5.0E-03	2.0E-04	1.3E-03	6.5E-03	6%
Manganese	25	25	309	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	—	—	0.0E+00	—	—
Mercury	25	6	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	2.4E-04	9.6E-06	—	2.5E-04	0.2%
Nickel	25	25	12.3	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Selenium	25	2	—	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	2.7E-05	1.1E-06	—	2.9E-05	0.03%
Silver	25	9	0.351	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Thallium	10	6	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	2.9E-03	1.1E-04	—	3.0E-03	3%
Vanadium	25	25	51.1	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	1.9E-04	7.7E-06	—	2.0E-04	0.2%
Zinc	25	25	147	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—

Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report^(a):

TOTAL RISK: 2.4E-06

TOTAL HI: 0.11

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	100	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	100	d/yr
Exposure Duration (ED) =	24	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	8760	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	5700	cm ² /event
Soil Adherence Factor (AF) =	0.07	mg/cm ²
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
ATc =	25550	days
ATnc =	8760	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	100	d/yr
ED =	24	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.32E+09	m ³ /kg
ATc =	25550	days
ATnc =	8760	days

Notes:

Shading indicates additional data was collected during May 1999.

NA = Not available or not applicable

— = Information not available or not applicable

HI = Hazard index

HQ = Hazard quotient

mg/kg = Milligrams per kilogram

ABS = Dermal absorption factor (unitless)

VF = Soil-to-air volatilization factor (m³/kg)

EPC = Exposure point concentration

^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹

CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹

RfDo = Oral reference dose (mg/kg-day)

RfDi = Inhalation reference dose (mg/kg-day)

VOC = Volatile organic chemical

Dermal Contact with Soil or Sediment:

Table C-35: Risks and Hazard Indices for Child Residents Exposed to Shallow Soil (0-10 feet) at Site 12, Unit 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
Acetone	10	7	0.0299	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	3.8E-06	1.1E-06	1.5E-05	2.0E-05	0.001%
Carbon disulfide	1	1	0.002	—	1.0E-01	—	2.0E-01	0.1	1.2E+03	—	—	—	—	—	2.6E-07	7.2E-08	5.4E-06	5.7E-06	0.0002%
Carbon tetrachloride	10	3	0.011	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	1.6E-09	4.4E-10	1.6E-08	1.8E-08	0.1%	2.0E-04	5.6E-05	5.2E-03	5.4E-03	0.2%
Methylene chloride	10	1	0.024	7.5E-03	6.0E-02	1.6E-03	8.6E-01	0.1	2.4E+03	2.0E-10	5.5E-11	9.0E-10	1.2E-09	0.01%	5.1E-06	1.4E-06	7.4E-06	1.4E-05	0.0004%
Toluene	10	4	0.0075	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	4.8E-07	1.3E-07	1.2E-05	1.3E-05	0.0004%
Xylenes	1	1	0.002	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	1.3E-08	3.6E-09	1.5E-06	1.5E-06	0.00004%
Benzo(a)anthracene	5	2	0.042	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	3.4E-08	1.4E-08	5.5E-13	4.8E-08	0.3%	2.7E-05	1.1E-05	2.4E-08	3.8E-05	0.001%
Benzo(a)pyrene	7	5	0.21	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	1.7E-06	7.1E-07	2.7E-11	2.4E-06	13%	1.3E-04	5.6E-05	1.2E-07	1.9E-04	0.01%
Benzo(b)fluoranthene	14	3	0.93	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	7.4E-07	3.1E-07	1.2E-11	1.1E-06	6%	5.9E-04	2.5E-04	5.3E-07	8.4E-04	0.03%
Benzo(g,h,i)perylene	5	2	0.059	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	3.8E-05	1.6E-05	3.4E-08	5.4E-05	0.002%
Benzo(k)fluoranthene	13	4	0.36	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	—	2.9E-08	1.2E-08	4.7E-13	4.1E-08	0.2%	2.3E-04	9.7E-05	2.0E-07	3.3E-04	0.01%
Bis(2-ethylhexyl)phthalate	9	2	0.6	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.1	—	9.2E-09	2.6E-09	3.5E-13	1.2E-08	0.1%	3.8E-04	1.1E-04	1.3E-08	4.9E-04	0.01%
Chrysene	14	4	0.37	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	3.0E-09	1.2E-09	4.8E-14	4.2E-09	0.02%	2.4E-04	9.9E-05	2.1E-07	3.4E-04	0.01%
Dibenz(a,h)anthracene	6	4	0.22	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	1.8E-06	7.4E-07	2.9E-11	2.5E-06	14%	1.4E-04	5.9E-05	1.3E-07	2.0E-04	0.01%
Fluoranthene	14	4	0.37	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	1.2E-04	5.0E-05	4.5E-09	1.7E-04	0.005%
Indeno(1,2,3-cd)pyrene	7	5	0.18	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.4E-07	6.0E-08	2.3E-12	2.0E-07	1%	1.2E-04	4.8E-05	1.0E-07	1.6E-04	0.005%
Phenanthrene	13	2	0.59	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	3.8E-04	1.6E-04	3.4E-07	5.4E-04	0.02%
Pyrene	14	4	0.409	—	3.0E-02	—	3.0E-02	0.15	—	—	—	—	—	—	1.7E-04	7.3E-05	6.7E-09	2.5E-04	0.01%
4,4'-DDD	27	21	0.29057	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	7.6E-08	1.1E-08	2.9E-12	8.7E-08	0.6%	7.4E-03	1.0E-03	2.8E-07	8.5E-03	0.25%
4,4'-DDE	27	21	0.89461	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	2.6E-07	3.6E-08	9.9E-12	3.0E-07	2%	1.8E-02	2.5E-03	6.8E-07	2.0E-02	1%
4,4'-DDT	28	24	3.65	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.4E-06	1.9E-07	5.2E-11	1.6E-06	9%	9.3E-02	1.3E-02	3.6E-06	1.1E-01	3%
alpha-Chlordane	18	5	0.00221	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	8.5E-10	1.2E-10	3.2E-14	9.7E-10	0.01%	5.7E-05	7.9E-06	5.4E-09	6.4E-05	0.002%
Aroclor 1254	20	4	0.0477	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	1.0E-07	4.1E-08	4.0E-12	1.5E-07	1%	3.0E-02	1.2E-02	1.2E-06	4.2E-02	1%
Aroclor 1260	16	5	0.085	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	1.9E-07	7.3E-08	7.1E-12	2.6E-07	1%	5.4E-02	2.1E-02	2.1E-06	7.6E-02	2%
Dieldrin	6	5	0.104	1.6E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	1.8E-06	2.6E-07	7.0E-11	2.1E-06	11%	2.7E-02	3.7E-03	1.0E-06	3.0E-02	1%
Endosulfan I	4	2	0.022	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	4.7E-05	6.6E-06	1.8E-09	5.3E-05	0.002%
Endosulfan II	15	2	0.016	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	3.4E-05	4.8E-06	1.3E-09	3.9E-05	0.001%
Endrin	4	3	0.051	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	2.2E-03	3.0E-04	8.3E-08	2.5E-03	0.1%
Endrin aldehyde	21	9	0.0263	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	1.1E-03	1.6E-04	4.3E-08	1.3E-03	0.04%
Endrin ketone	17	2	0.133	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	5.7E-03	7.9E-04	2.2E-07	6.5E-03	0.2%
gamma-Chlordane	17	6	0.0033	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	1.3E-09	1.8E-10	4.8E-14	1.4E-09	0.01%	8.4E-05	1.2E-05	8.1E-09	9.6E-05	0.003%
Methoxychlor	5	5	0.175	—	5.0E-03	—	5.0E-03	0.05	—	—	—	—	—	—	4.5E-04	6.3E-05	1.7E-08	5.1E-04	0.02%
Dalapon	24	4	0.07	—	3.0E-02	—	3.0E-02	0.05	—	—	—	—	—	—	3.0E-05	4.2E-06	1.1E-09	3.4E-05	0.001%
2,4-D	14	1	0.14	—	1.0E-02	—	1.0E-02	0.05	—	—	—	—	—	—	1.8E-04	2.5E-05	6.9E-09	2.0E-04	0.01%
MCP	25	1	153	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	2.0E+00	2.7E-01	7.5E-05	2.2E+00	67%
Aluminum	25	25	19100	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	2.4E-01	6.8E-03	6.7E-03	2.6E-01	8%
Antimony	14	10	0.5	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Arsenic	25	23	4.18	1.5E+00	3.0E-04	1.5E+01	1.4E-04	0.01	—	6.9E-06	5.8E-07	2.6E-09	7.5E-06	41%	1.8E-01	1.5E-02	—	1.9E-01	6%
Barium	25	25	197	—	7.0E-02	—	—	0.01	—	—	—	—	—	—	3.6E-02	1.0E-03	6.8E-04	3.8E-02	1%
Beryllium	25	6	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	25	25	2.22	—	5.0E-04	6.3E+00	—	0.001	—	—	—	3.4E-08	3.4E-08	0.2%	—	—	—	—	—
Chromium	25	25	19.5	—	—	4.2E+01	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Cobalt	25	25	8.76	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	1.9E-03	5.2E-05	—	1.9E-03	0.1%
Copper	25	25	18.3	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	6.3E-03	1.8E-04	—	6.5E-03	0.2%
Lead	25	25	195	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	25	25	309	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	1.6E-01	4.6E-03	1.1E-02	1.8E-01	5%
Mercury	25	6	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	0.0E+00	—	—
Nickel	25	25	12.3	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	7.9E-03	2.2E-04	—	8.1E-03	0.2%
Selenium	25	2	—	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Silver	25	9	0.351	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	9.0E-04	2.5E-05	—	9.2E-04	0.03%
Thallium	10	6	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	25	25	51.1	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	9.3E-02	2.6E-03	—	9.6E-02	3%
Zinc	25	25	147	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	6.3E-03	1.8E-04	—	6.4E-03	0.2%

Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report^(a):

TOTAL RISK: 1.8E-05

TOTAL HI: 3.3

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:		
Soil ingestion rate (IRs) =	200	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	350	d/yr
Exposure Duration (ED) =	6	yr
Body Weight (BW) =	15	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	2190	days

Dermal Contact with Soil or Sediment:

CF =	1.0E-06	kg/mg
Body Surface Area (SA) =	2800	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
ATc =	25550	days
ATnc =	2190	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.42	m ³ /hr
Exposure Time (ET) =	24	hr/day
EF =	350	d/yr
ED =	6	yr
BW =	15	kg
Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg
ATc =	25550	days
ATnc =	2190	days

Notes:

Shading indicates additional data was collected during May 1999.
NA = Not available or not applicable
— = Information not available or not applicable
HI = Hazard index
HQ = Hazard quotient
mg/kg = Milligrams per kilogram
ABS = Dermal absorption factor (unitless)
VF = Soil-to-air volatilization factor (m³/kg)
EPC = Exposure point concentration
^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹
CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹
RfDo = Oral reference dose (mg/kg-day)
RfDi = Inhalation reference dose (mg/kg-day)
VOC = Volatile organic chemical

Dermal Contact with Soil or Sediment:

Table C-36: Risks and Hazard Indices for Industrial Workers Exposed to Surface Soil (0-2 feet) at Site 12, Unit 3

Chemical	Number of Analyses	Number of Detections	EPC (mg/kg)	CSFo	RfDo	CSFi	RfDi	ABS	VF	Oral Risk	Dermal Risk	Inh Risk	Total Risk	% Contribution to Risk	Oral HQ	Dermal HQ	Inh HQ	Total HQ	% Contribution to HI
Acetone	7	5	0.035	—	1.0E-01	—	1.0E-01	0.1	1.3E+04	—	—	—	—	—	1.7E-07	2.3E-07	1.8E-06	2.2E-06	0.001%
Carbon disulfide	1	1	0.002	—	1.0E-01	—	2.0E-01	0.1	1.2E+03	—	—	—	—	—	9.8E-09	1.3E-08	5.5E-07	5.7E-07	0.0001%
Carbon tetrachloride	7	3	0.011	1.3E-01	7.0E-04	5.3E-02	7.0E-04	0.1	2.0E+03	2.5E-10	3.3E-10	6.8E-09	7.4E-09	0.1%	7.7E-06	1.0E-05	5.2E-04	5.4E-04	0.1%
Methylene chloride	7	1	0.024	7.5E-03	6.0E-02	1.6E-03	8.6E-01	0.1	2.4E+03	3.1E-11	4.2E-11	3.8E-10	4.5E-10	0.01%	2.0E-07	2.6E-07	7.5E-07	1.2E-06	0.0003%
Toluene	7	4	0.00908	—	2.0E-01	—	1.1E-01	0.1	3.6E+03	—	—	—	—	—	2.2E-08	2.9E-08	1.5E-06	1.6E-06	0.0004%
Xylenes	1	1	0.002	—	2.0E+00	—	2.0E-01	0.1	4.4E+03	—	—	—	—	—	4.9E-10	6.5E-10	1.5E-07	1.5E-07	0.0000%
Benz(a)anthracene	4	2	0.042	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	5.4E-09	1.1E-08	2.3E-13	1.6E-08	0.2%	1.0E-06	2.0E-06	2.4E-09	3.1E-06	0.001%
Benzo(a)pyrene	6	4	0.21	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	2.7E-07	5.3E-07	1.1E-11	8.0E-07	11%	5.1E-06	1.0E-05	1.2E-08	1.5E-05	0.004%
Benzo(b)fluoranthene	10	3	0.93	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	1.2E-07	2.3E-07	5.1E-12	3.5E-07	5%	2.3E-05	4.5E-05	5.3E-08	6.8E-05	0.02%
Benzo(g,h,i)perylene	4	2	0.059	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	1.4E-06	2.9E-06	3.4E-09	4.3E-06	0.001%
Benzo(k)fluoranthene	9	3	0.55	7.3E-02	2.0E-02	3.1E-02	8.6E-04	0.15	—	7.0E-09	1.4E-08	3.0E-13	2.1E-08	0.3%	1.3E-05	2.7E-05	3.2E-08	4.0E-05	0.01%
Bis(2-ethylhexyl)phthalate	6	2	0.6	1.4E-02	2.0E-02	1.4E-02	2.2E-02	0.1	—	1.5E-09	1.9E-09	1.5E-13	3.4E-09	0.05%	1.5E-05	1.9E-05	1.3E-09	3.4E-05	0.01%
Chrysene	10	4	0.493	7.3E-03	2.0E-02	3.1E-03	8.6E-04	0.15	—	6.3E-10	1.2E-09	2.7E-14	1.9E-09	0.03%	1.2E-05	2.4E-05	2.8E-08	3.6E-05	0.01%
Dibenz(a,h)anthracene	5	3	0.13	7.3E+00	2.0E-02	3.1E+00	8.6E-04	0.15	—	1.7E-07	3.3E-07	7.1E-12	4.9E-07	7%	3.2E-06	6.3E-06	7.6E-09	9.5E-06	0.002%
Fluoranthene	10	4	1.7	—	4.0E-02	—	4.0E-02	0.15	—	—	—	—	—	—	2.1E-05	4.1E-05	2.1E-09	6.2E-05	0.02%
Indeno(1,2,3-cd)pyrene	6	4	0.18	7.3E-01	2.0E-02	3.1E-01	8.6E-04	0.15	—	2.3E-08	4.5E-08	9.8E-13	6.8E-08	1%	4.4E-06	8.7E-06	1.0E-08	1.3E-05	0.00%
Phenanthrene	9	2	0.59	—	2.0E-02	—	8.6E-04	0.15	—	—	—	—	—	—	1.4E-05	2.9E-05	3.4E-08	4.3E-05	0.01%
Pyrene	10	4	0.455	—	3.0E-02	—	3.0E-02	0.15	—	—	—	—	—	—	7.4E-06	1.5E-05	7.5E-10	2.2E-05	0.01%
4,4'-DDD	17	17	0.741	2.4E-01	5.0E-04	2.4E-01	5.0E-04	0.05	—	3.1E-08	2.1E-08	3.1E-12	5.2E-08	1%	7.3E-04	4.8E-04	7.3E-08	1.2E-03	0.31%
4,4'-DDE	18	18	0.845	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	5.0E-08	3.3E-08	5.1E-12	8.3E-08	1%	8.3E-04	5.5E-04	8.3E-08	1.4E-03	0.35%
4,4'-DDT	18	18	2.46	3.4E-01	5.0E-04	3.4E-01	5.0E-04	0.05	—	1.5E-07	9.6E-08	1.5E-11	2.4E-07	3%	2.4E-03	1.6E-03	2.4E-07	4.0E-03	1%
alpha-Chlordane	10	5	0.0785	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	4.8E-09	3.2E-09	4.8E-13	8.0E-09	0.1%	7.7E-05	5.1E-05	1.9E-08	1.3E-04	0.03%
Aroclor 1254	12	4	2.49	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	8.7E-07	1.6E-06	8.8E-11	2.5E-06	34%	6.1E-02	1.1E-01	6.1E-06	1.7E-01	45%
Aroclor 1260	8	4	0.64	2.0E+00	2.0E-05	2.0E+00	2.0E-05	0.14	—	2.2E-07	4.1E-07	2.3E-11	6.4E-07	9%	1.6E-02	2.9E-02	1.6E-06	4.5E-02	11%
Dieldrin	6	5	0.104	1.8E+01	5.0E-05	1.6E+01	5.0E-05	0.05	—	2.9E-07	1.9E-07	3.0E-11	4.8E-07	7%	1.0E-03	6.7E-04	1.0E-07	1.7E-03	0.4%
Endosulfan I	4	2	0.022	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.8E-06	1.2E-06	1.8E-10	3.0E-06	0.001%
Endosulfan II	7	2	0.016	—	6.0E-03	—	6.0E-03	0.05	—	—	—	—	—	—	1.3E-06	8.6E-07	1.3E-10	2.2E-06	0.001%
Endrin	4	3	0.051	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	8.3E-05	5.5E-05	8.4E-09	1.4E-04	0.04%
Endrin aldehyde	13	8	0.0856	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	1.4E-04	9.2E-05	1.4E-08	2.3E-04	0.1%
Endrin ketone	11	2	0.133	—	3.0E-04	—	3.0E-04	0.05	—	—	—	—	—	—	2.2E-04	1.4E-04	2.2E-08	3.6E-04	0.1%
gamma-Chlordane	9	5	0.0931	3.5E-01	5.0E-04	3.5E-01	2.0E-04	0.05	—	5.7E-09	3.8E-09	5.7E-13	9.5E-09	0.1%	9.1E-05	6.0E-05	2.3E-08	1.5E-04	0.04%
Methoxychlor	5	5	0.175	—	5.0E-03	—	5.0E-03	0.05	—	—	—	—	—	—	1.7E-05	1.1E-05	1.7E-09	2.8E-05	0.01%
Dalapon	13	3	0.135	—	3.0E-02	—	3.0E-02	0.05	—	—	—	—	—	—	2.2E-06	1.5E-06	2.2E-10	3.7E-06	0.001%
2,4-D	11	1	0.14	—	1.0E-02	—	1.0E-02	0.05	—	—	—	—	—	—	6.8E-06	4.5E-06	6.9E-10	1.1E-05	0.003%
MCPD	14	1	153	—	1.0E-03	—	1.0E-03	0.05	—	—	—	—	—	—	7.5E-02	4.9E-02	7.6E-06	1.2E-01	32%
Aluminum	14	14	19300	—	1.0E+00	—	1.4E-03	0.01	—	—	—	—	—	—	9.4E-03	1.2E-03	6.8E-04	1.1E-02	3%
Antimony	6	4	—	—	4.0E-04	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Arsenic	14	13	4.41	1.5E+00	3.0E-04	1.5E+01	—	0.03	—	1.2E-06	4.6E-07	1.2E-09	1.6E-06	22%	7.2E-03	2.8E-03	—	1.0E-02	3%
Barium	14	14	169	—	7.0E-02	—	1.4E-04	0.01	—	—	—	—	—	—	1.2E-03	1.6E-04	5.8E-05	1.4E-03	0.4%
Beryllium	14	3	—	—	2.0E-03	8.4E+00	5.7E-06	0.01	—	—	—	—	—	—	—	—	—	—	—
Cadmium	14	14	3.07	—	5.0E-04	6.3E+00	—	0.001	—	—	—	—	—	—	—	—	—	—	—
Chromium	14	14	22.8	—	—	4.2E+01	—	0.01	—	—	—	1.7E-08	1.7E-08	0.2%	—	—	—	—	—
Cobalt	14	14	7.8	—	6.0E-02	—	—	0.01	—	—	—	—	—	—	6.4E-05	8.4E-06	—	7.2E-05	0.02%
Copper	14	14	24.5	—	3.7E-02	—	—	0.01	—	—	—	—	—	—	3.2E-04	4.3E-05	—	3.7E-04	0.1%
Lead	14	14	517	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Manganese	14	14	304	—	2.4E-02	—	1.4E-05	0.01	—	—	—	—	—	—	6.2E-03	8.2E-04	1.1E-03	8.1E-03	2%
Mercury	14	6	—	—	—	—	8.6E-05	0.01	—	—	—	—	—	—	—	—	0.0E+00	—	—
Nickel	14	14	14.6	—	2.0E-02	—	—	0.01	—	—	—	—	—	—	3.6E-04	4.7E-05	—	4.0E-04	0.1%
Selenium	14	2	—	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Silver	14	8	2.03	—	5.0E-03	—	—	0.01	—	—	—	—	—	—	2.0E-04	2.6E-05	—	2.2E-04	0.1%
Thallium	7	3	—	—	6.6E-05	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
Vanadium	14	14	51	—	7.0E-03	—	—	0.01	—	—	—	—	—	—	3.6E-03	4.7E-04	—	4.0E-03	1%
Zinc	14	14	235	—	3.0E-01	—	—	0.01	—	—	—	—	—	—	3.8E-04	5.1E-05	—	4.3E-04	0.1%
Revised Cumulative Risk and Cumulative Hazard Index for COPCs Identified in RI Report ^(a) :										TOTAL RISK: 7.4E-06					TOTAL HI: 0.39				

Exposure Parameters:

Incidental Ingestion of Soil or Sediment:

Soil ingestion rate (IRs) =	50	mg/d
Conversion Factor (CF) =	1.00E-06	kg/mg
Fraction Contaminated Soil Ingested =	1	unitless
Exposure Frequency (EF) =	250	d/yr
Exposure Duration (ED) =	25	yr
Body Weight (BW) =	70	kg
Carcinogenic Averaging Time (ATc) =	25550	days
Noncarcinogenic Averaging Time (ATnc) =	9125	days

Dermal Contact with Soil or Sediment:

CF =	1.00E-06	kg/mg
Body Surface Area (SA) =	3300	cm ² /event
Soil Adherence Factor (AF) =	0.2	mg/cm ²
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
ATc =	25550	days
ATnc =	9125	days

Inhalation of Dust and VOCs:

Inhalation Rate (InhR) =	0.83	m ³ /hr
Exposure Time (ET) =	8	hr/day
EF =	250	d/yr
ED =	25	yr
BW =	70	kg
Particulate Emission Factor (PEF) =	1.3E+09	m ³ /kg
ATc =	25550	days
ATnc =	9125	days

Notes:

Shading indicates additional data was collected during May 1999.

NA = Not available or not applicable

— = Information not available or not applicable

HI = Hazard index

HQ = Hazard quotient

mg/kg = Milligrams per kilogram

ABS = Dermal absorption factor (unitless)

VF = Soil-to-air volatilization factor (m³/kg)

EPC = Exposure point concentration

^(a) Exposure parameters were updated in addition to toxicity factors.

CSFo = Oral cancer slope factor (mg/kg-day)⁻¹

CSFi = Inhalation cancer slope factor (mg/kg-day)⁻¹

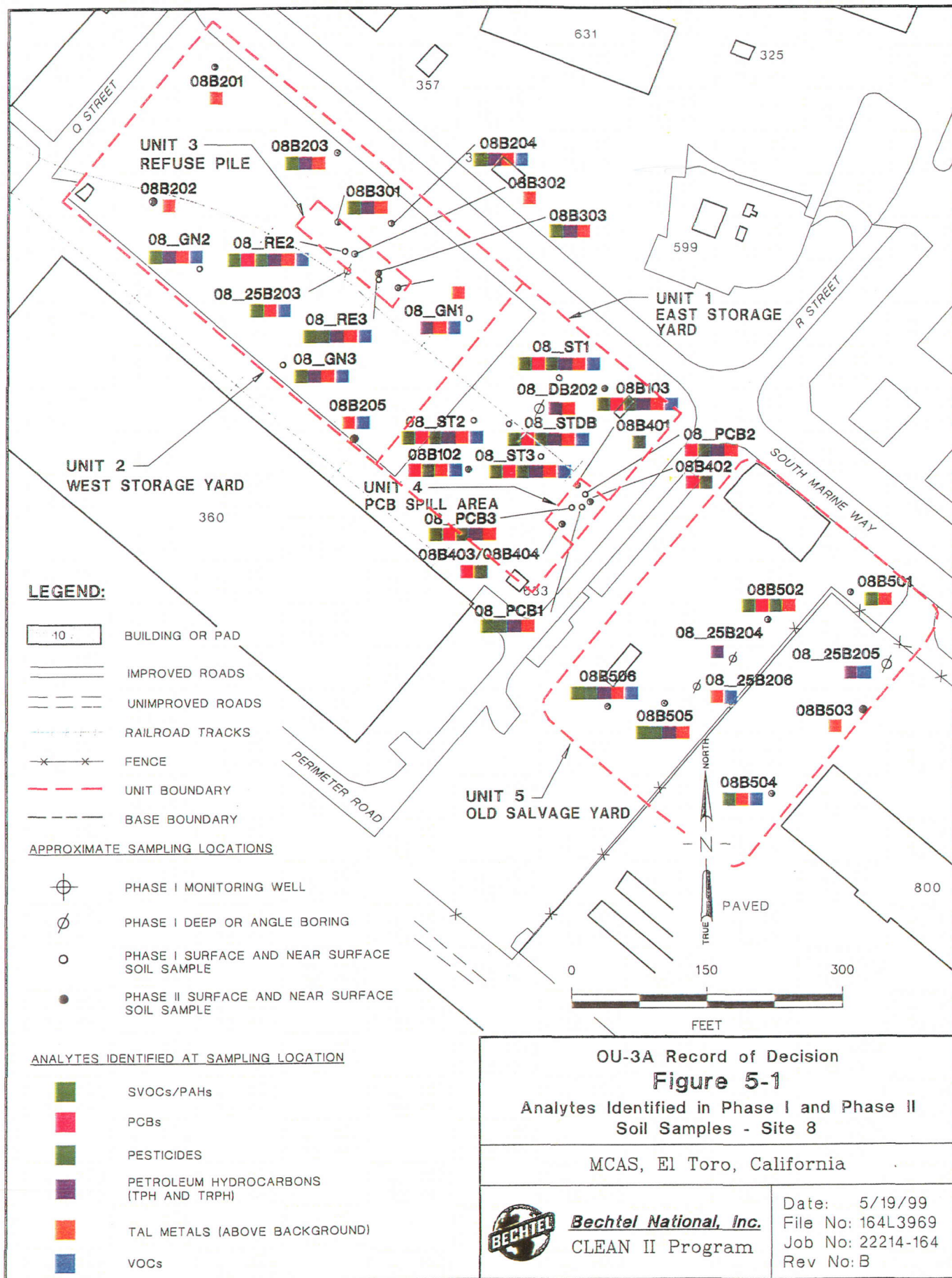
RfDo = Oral reference dose (mg/kg-day)

RfDi = Inhalation reference dose (mg/kg-day)

VOC = Volatile organic chemical

Dermal Contact with Soil or Sediment:

Appendix D
Site 8—Unit 5
Additional Sampling Locations (May 1999)
Relative to Phase I and II Remedial Investigation Sampling Locations



CAS, EL TORO

IRP SITE 8/DO 65



Graphic Scale

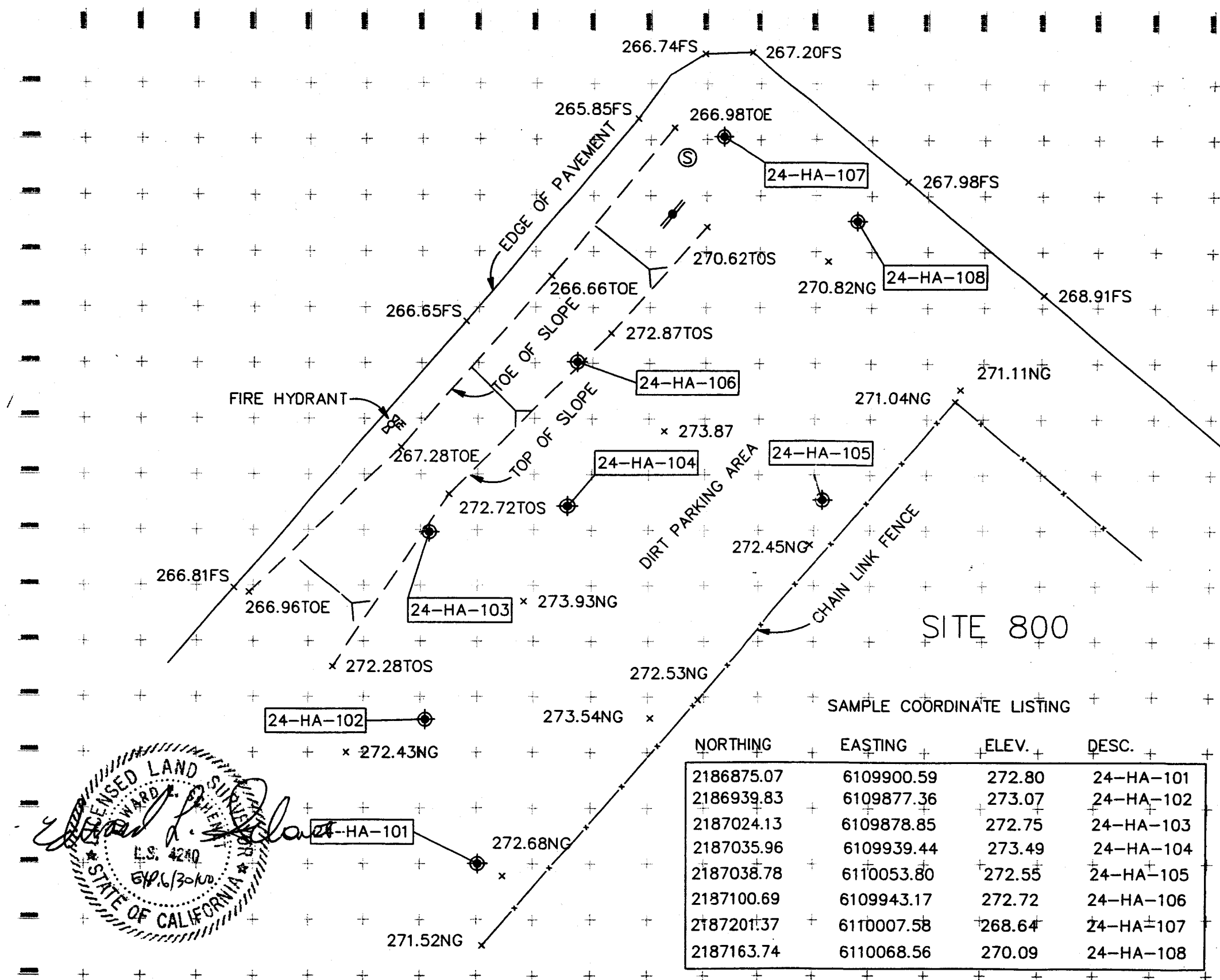


1 inch = 50 ft.

LEGEND

- ◆ SAMPLE POINTS
- NG NATURAL GROUND
- FS FINISH SURFACE
- Ⓢ SEWER MANHOLE
- POWER POLE

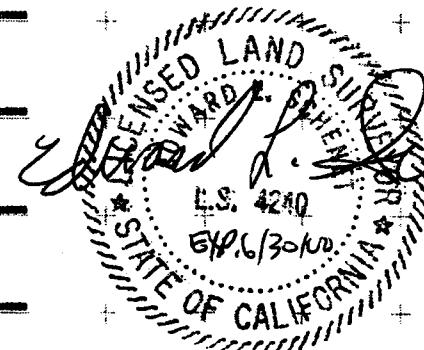
DATE OF SURVEY: 7-14-99



SITE 800

SAMPLE COORDINATE LISTING

NORTHING	EASTING	ELEV.	DESC.
2186875.07	6109900.59	272.80	24-HA-101
2186939.83	6109877.36	273.07	24-HA-102
2187024.13	6109878.85	272.75	24-HA-103
2187035.96	6109939.44	273.49	24-HA-104
2187038.78	6110053.80	272.55	24-HA-105
2187100.69	6109943.17	272.72	24-HA-106
2187201.37	6110007.58	268.64	24-HA-107
2187163.74	6110068.56	270.09	24-HA-108



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Appendix E
Responses to BCT Comments

Document Title:

- (1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: Triss M. Chesney, P.E.- Remedial Project Manager, Office of Military Facilities, DTSC, dated: June 26, 2002

Comment No.	Section/ Page No.	Comment	Response
GENERAL COMMENTS			
1.		DTSC understands that the risk evaluation was conducted to incorporate the most current toxicity information and exposure factors. Additional sampling data obtained from selected areas was also incorporated. However, review of the reevaluated cancer risks and hazard indices indicates that these values have not changed significantly from those presented in the Proposed Plan released to the public in May 1999.	Comment noted. It should be noted that there were significant changes in the cancer and non-cancer risks for the residential scenario as summarized below: Site 8-Units 2 and 3: Risk decreased by 74% to 1.1×10^{-5} ; HI decreased by 47% to 1.24. Site 8-Unit 5: Risk decreased 3 orders of magnitude to 3.0×10^{-7} ; HI decreased by 47% to 0.58. Site 11-Unit 1: Risk decreased by 1 order of magnitude to 9.8×10^{-6} ; HI decreased by 45% to 2.49. Site 11-Unit 2: Risk decreased by 22% to 4.6×10^{-6} ; HI increased by 260% to 1.08. Site 12-Unit 3: Risk decreased by 59% to 2.1×10^{-5} ; HI decreased by 44% to 3.32.
2.		Please provide a comparison of detected to background concentrations to justify determinations that the risks associated with metals can be attributed to background conditions.	In instances where metals are significant contributors to risk, a comparison of the exposure point concentrations for a unit to the stationwide background has been included in the risk management considerations and recommendations section.

Document Title:

(1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: Nicole G. Moutoux- United States Environmental Protection Agency, Region IX, Project Manager, Federal Facilities Cleanup Branch, 27 September 01

Comment No.	Section/ Page No.	Comment	Response
GENERAL COMMENTS			
1.		While we understand the Navy revisiting their initial decisions due to changes in toxicity values, given that the majority of risks are due to PCBs, and risks did not significantly change at most sites, we find it difficult to support NFA using the justification in the tech memo, particularly when these risks and proposed actions have already been presented to the public.	<p>Comment noted. Subsequent to issuance of these comments, extensive discussions regarding the results of risk reevaluation have taken place. These discussions are ongoing for Sites 8 and 12, and DON anticipates that consensus on any potential changes to the response action decisions (further action or no further action) and selected response actions at these two sites will be reached soon. For Site 11 and Site 8 – Unit 5, these discussions have been completed and consensus regarding the response action has been reached.</p> <p>The recommendations presented in the Draft version of the risk reevaluation tech memo have been revised based on the above-mentioned discussions. These recommendations include the following</p> <ul style="list-style-type: none"> • Reevaluation of the risk management considerations by BCT recommended for Unit 3 at Site 8 and Unit 3 at Site 12. • Based on discussions with the BCT, concurrence on pursuing a NFA status for Site 8 - Unit 5 has been reached. • No change in selected response actions for Units 1 and 2 of Site 11. However the cleanup evaluation at these two units to be based on the updated slope factors and toxicity criteria. • NFA for the Units 1, 2, and 4 of Site 8; Unit 3 of Site 11; Units 1, 2 and 4 of Site 12. <p>Regarding the changes in the risks compared to the initial values, it should be noted that there were significant changes in the cancer and non-cancer risks for the residential scenario as summarized below:</p> <p>Site 8-Units 2 and 3: Risk decreased by 74% to 1.1×10^{-5}; HI decreased by 47% to 1.24.</p> <p>Site 8-Unit 5: Risk decreased 3 orders of magnitude to 3.0×10^{-7}; HI decreased by 47% to 0.58.</p> <p>Site 11-Unit 1: Risk decreased by 1 order of magnitude to 9.8×10^{-6}; HI decreased by 45% to 2.49.</p> <p>Site 11-Unit 2: Risk decreased by 22% to 4.6×10^{-6}; HI increased by 260% to 1.08.</p> <p>Site 12-Unit 3: Risk decreased by 59% to 2.1×10^{-5}; HI decreased by 44% to 3.32.</p>

Document Title:

(1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: Nicole G. Moutoux- United States Environmental Protection Agency, Region IX, Project Manager, Federal Facilities Cleanup Branch, 27 September 01

Comment No.	Section/ Page No.	Comment	Response
SPECIFIC COMMENTS			
1.	Site 8 – Units 2 and 3	The Navy did not collect any additional data for these units and the risk did not change significantly using the new toxicity factors. Given that the HI remains above 1 and is primarily due to PCBs, which are persistent, and clearly a Navy source of contamination, EPA is not convinced that the rationale provided by the Navy for NFA is adequate.	Comment noted. The risks at Units 2 and 3 of Site 8 are mainly due to PCBs, which were only evidenced at Unit 3. No PCBs were found in the samples from Unit 2. Therefore the updated version of the risk reevaluation tech memo recommends NFA for Unit 2 and reevaluation of risk management considerations by BCT for Unit 3 of Site 8.
2.	Site 8 – Unit 5	The drawing provided in Appendix D is not very legible. The reader is unable to distinguish between PAHs and pesticides (as both are green on the legend). In addition, it is difficult to determine where the Phase II samples were taken. As the Phase II sample results are the basis for changing the decision to NFA, please provide a more legible map.	<p>The reviewer may be referring to the additional samples as Phase II samples. It should be noted that Phase II samples were obtained during 1996 as part of the Phase II RI; additional data subsequent to the RI were collected during May 1999 and incorporated in the data set for the risk reevaluation.</p> <p>The drawing provided in Appendix D indicates that it is from the OU-3A Record of Decision, Figure 5-1 and is not very legible due to duplication. All BCT members, including EPA, should have received an original version of the document (when first produced). An original copy will be included, as requested. Please note that the May 1999 additional samples were obtained from the western half of Unit 5, which was identified in the Draft ROD for the removal of approximately 18,850 cubic yards.</p> <p>The intent of providing the drawing from the ROD (showing the Phase I and II RI sampling locations) is not as much to distinguish locations where PAHs were detected, but to convey that the additional sampling conducted in May 1999 improved the coverage over the western section of Site 8-Unit 5, which was identified for removal action.</p> <p>The change in decision to NFA was based just on the updated toxicity values (with or without the additional data), which result in the reduction of the risk to 4.3×10^{-5} and the HI to 0.61 for the residential scenario.</p> <p>The use of the additional data (May 1999) to confirm certain Data Validation flags pertaining to inconsistencies in the Phase II RI data resulted in the exclusion of PAHs as chemicals of concern since none were detected. Accordingly, the risk/HI was recalculated</p>

Document Title:

- (1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: Nicole G. Moutoux- United States Environmental Protection Agency, Region IX, Project Manager, Federal Facilities Cleanup Branch, 27 September 01

Comment No.	Section/ Page No.	Comment	Response
			<p>without the PAHs, which results in even further reductions of risk/HI (3×10^{-7} and 0.58 respectively).</p> <p>Based on discussions and clarifications subsequent to the comments being issued, concurrence from the BCT to pursue a NFA has been received.</p>
3.	Site 11 – Unit 1	As mentioned for Site 8, the Navy did not collect additional samples for this location, the risks did not significantly change, and the HI is still at 2.49 for the persistent contaminant PCBs. EPA does not believe that NFA is justified based solely on a change in toxicity values.	We concur with the comment and based on the discussions with BCT members, there will be no change to the selected response action at this site. However, the cleanup evaluation will be based on updated exposure factors and toxicity criteria.
4.	Site 11 – Unit 2	Although the risk is quite low for this unit, the recalculated risk is not significantly lower and all the additional samples detected PCBs at some level. Given that the additional sampling confirmed the existence of PCBs, EPA again does not feel that NFA is justified.	We concur with the comment and based on the discussions with BCT members, there will be no change to the selected response action at this site. However, the cleanup evaluation will be based on updated exposure factors and toxicity criteria.
5.	Site 12 – Unit 3	<p>Please note that on page 4-2, the newly calculated residential risk should be 2.1×10^{-5} instead of 1.1×10^{-5}.</p> <p>As above, the risks for this unit decreased only slightly from the original risk and the HI remains over 3. The additional samples appear to have only been analyzed for pesticides and herbicides and therefore are not very useful in determining how much risk is attributable to arsenic, which the Navy maintains is responsible for driving the risk.</p>	<p>The typographical error in the text on Page 4-2 will be corrected to indicate 2.1×10^{-5}.</p> <p>Arsenic was the predominant risk driver in the RI risk assessment (27%) and the risk reevaluation (41%) for the residential use scenario. Arsenic was not a risk driver for the HI in the RI risk assessment. Please note that FA was recommended in the RI risk assessment due to the elevated HI of 5.9 (and not the cancer risk), the primary driver for which was the Herbicide MCP. The additional sample data have only resulted in the increase of the contribution of Arsenic to the risk/HI.</p>

Document Title:

- (1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: John P. Christopher, Ph.D., D.A.B.T, Staff Toxicologist, Human and Ecological Risk Division, DTSC, dated: June 21, 2002

Comment No.	Section/ Page No.	Comment	Response
GENERAL COMMENTS			
1.	Overall	The report is clear and well written. The Navy has correctly re-evaluated risks and hazards, using the most recent toxicity criteria and exposure factors. The Navy concludes that no further action is required at all three sites, but we find that re-evaluated cancer risks or non-cancer hazards exceed their respective benchmarks of 1 E-6 or 1.0 for most units of the three sites. Estimated risks due to arsenic are overestimated in some cases, because detected concentrations are within the ambient range.	<p>Comment noted. Subsequent to issuance of these comments, extensive discussions regarding the results of risk reevaluation have taken place. These discussions are ongoing for Sites 8 and 12, and DON anticipates that consensus on any potential changes to the response action decisions (further action or no further action) and selected response actions at these two sites will be reached soon. For Site 11 and Site 8 Unit 5, these discussions have been completed and consensus regarding the response action has been reached.</p> <p>The recommendations presented in the Draft version of the risk reevaluation tech memo have been revised based on the above-mentioned discussions. These recommendations include the following</p> <ul style="list-style-type: none"> • Reevaluation of the risk management considerations by BCT recommended for Units 3 at Site 8 and Unit 3 at Site 12. • Based on discussions with the BCT, concurrence on pursuing a NFA status for Site 8 - Unit 5 has been reached. • No change in selected response actions for Units 1 and 2 of Site 11. However the cleanup evaluation at these two units to be based on the updated slope factors and toxicity criteria. • NFA for the Units 1, 2, and 4 of Site 8; Unit 3 of Site 11; Units 1, 2 and 4 of Site 12. <p>The fact that the estimated risks due to arsenic are overestimated in some cases has been added to the discussion of risk management considerations in section 4 of the revised report.</p>
2.	Toxicity of PCBs	In late 1996 USEPA made substantial modifications to information on the toxicity of PCBs published in the Integrated Risk Information System (IRIS). In the risk assessments for the OU-3A sites from the remedial investigation reports of 1996 and 1997, the Navy made use of older information on the toxicity of PCBs, which led to higher estimates of cancer risk and lower	Comment Noted.

Document Title:

- (1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: John P. Christopher, Ph.D., D.A.B.T., Staff Toxicologist, Human and Ecological Risk Division, DTSC, dated: June 21, 2002

Comment No.	Section/ Page No.	Comment	Response
		risks of non-cancer hazard for PCBs. In the current document the Navy makes proper use of the latest information on the toxicity of PCBs. Most of the remainder of the changes in the current re-evaluation of risk arise from a substantial decrease in the recommended exposure factor for the amount of soil that adheres to skin, known as the dermal adherence factor. Both the change in toxicity estimates for PCBs and the change in the dermal adherence lead generally to lower estimates of risk and hazard for Sites 8, 10, & 11.	
SPECIFIC COMMENTS			
1.	Site 8, Sec. 3.1, Pg. 3-2, Table 3-1	<p>The re-evaluation of risk and hazard for Units 1 & 4 shows about a fivefold reduction in estimation of cancer risk in the residential setting to 4E-6 and about tenfold reduction for the industrial receptor to 1 E-6. Principal risk drivers are PCBs and PAH. The non-cancer hazard index is less than 1.0 for both groups. We agree with the re-evaluation. The Navy recommends no further action for Units 1 & 4, but HERD recommends a risk management decision by the project team, because estimated cancer risks for both receptor groups still exceed 1 E-6.</p> <p>At Units 2 & 3, the re-evaluation shows about a fourfold reduction of estimated cancer risk, to 1 E-5 for the residential receptor and 1 E-6 for the industrial receptor of estimated cancer risk, to 1 E-5 for the residential receptor and 1 E-6 for the industrial receptor. Principal risk drivers are arsenic, PCBs, and PAHs. The re-evaluated estimated of non-cancer hazard for the residential receptor decreased by a factor of two to 1.2. However, no single target organ shows a summed hazard index as large as 1.0. The Navy recommends no further action for Units 2 & 3, but HERD recommends a risk management decision by the project team, because estimated cancer risks the residential receptors still exceeds 1 E-6.</p> <p>At Unit 5, additional sampling failed to detect benzo(k)fluoranthene or ideno(1,2,3-c,d)pyrene, both of which were detected during sampling for the remedial investigation in 1996. We agree with the Navy that the most recent data</p>	<p><u>Units 1 and 4</u></p> <p>No further action has already been documented for Units 1 and 4 of Site 8 in the Draft ROD for Sites 8, 11 and 12, based on the previous risk assessment (done as a part of Phase II RI). Additionally, the risk reevaluation showed that the risks are significantly lower than the previously calculated values. Therefore DON does not concur with the DTSC's request to reconsider the previous risk management decision for Units 1 and 4 of Site 8.</p> <p><u>Units 2 and 3</u></p> <p>No further action has already been documented for Unit 2 in the Draft ROD for Sites 8, 11 and 12, as PCBs that were the main risk drivers for Units 2 and 3 were not evidenced in Unit 2. Additionally the risk reevaluation concluded that the cancer and noncancer risks at Units 2 and 3 are even lower than the previously calculated values and are mainly due to arsenic and manganese, which are not associated with site related activities. Therefore, DON does not concur with DTSCs request to reconsider the previous risk management decision for Unit 2 of Site 8. However for Unit 3, discussions with BCT members regarding the potential changes to selected response action are ongoing.</p> <p><u>Unit 5</u></p> <p>Comment noted. Based on this</p>

Document Title:

- (1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: John P. Christopher, Ph.D., D.A.B.T, Staff Toxicologist, Human and Ecological Risk Division, DTSC, dated: June 21, 2002

Comment No.	Section/ Page No.	Comment	Response
		may be used to characterize the site. The re-evaluation of cancer risk for the residential cancer risk based on data from 0-10 ft bgs fell more than two orders of magnitude to 3 E-7 . The estimate for the industrial worker, based on data from 0-2 ft bgs, fell about 50-fold, but it still just exceeds the benchmark at 1.2 E-6 . More than 95% of this risk to the industrial receptor is due to arsenic. The highest concentration of arsenic detected anywhere at Unit 5 was 5.1 mg/kg (Draft Final RI Report, 1997, Attachment C, Table 4-14), which is well within the range of ambient concentrations of arsenic for soils at MCAS El Toro (0.3-8.5 mg/kg, Draft Final RI Report, 1997, Table 4-2). Therefore, we concur with the Navy's estimates that risks and hazards are less than their respective benchmarks. At Unit 5.	concurrency with risk reevaluation and the statement that the estimates are below their respective benchmarks, a no further action status for this unit will be pursued.
2.	Site 11, Sec. 3.2, pg. 3-2, Table 3-2	<p>Estimates of risk and hazard at Site 11 are driven by PCBs, particularly Aroclor 1260. This is the most toxic of the Aroclor mixtures. The renewly published information on toxicity of PCBs by USEPA produced few changes in the evaluation of the toxicity of Aroclor 1260.</p> <p>For Unit 1 of Site 11, re-evaluated estimates of cancer risk fell tenfold to 1 E-5 for the resident and fivefold to 3 E-6 for the worker. The hazard quotient for Aroclor 1260 fell twofold to 2.5 for the resident and fivefold to less than 1.0 for the worker. The Navy recommends no further action for Unit 1, but HERD recommends a risk management decision by the project team, because estimated cancer risks for the residential and industrial receptors still exceed 1 E-6.</p> <p>For Unit 2, estimates of residential cancer risk based on 0-10 ft bgs fell more than 200-fold to 2 E-7. The hazard quotient for Aroclor 1260 for the residential actually rose about threefold to 1.08. This change is due to USEPA's increased estimate of non-cancer toxicity for this mixture of highly chlorinated PCBs. The hazard quotient for the worker is much less than 1.0. The Navy recommends no further action for Unit 2, but HERD recommends a risk management decision by the project team, because estimated cancer</p>	We concur with the comment and based on the discussions with BCT members, there will be no change to the selected response action at this site. However, the cleanup evaluation will be based on updated exposure factors and toxicity criteria.

Document Title:

- (1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: John P. Christopher, Ph.D., D.A.B.T., Staff Toxicologist, Human and Ecological Risk Division, DTSC, dated: June 21, 2002

Comment No.	Section/ Page No.	Comment	Response
		<p>risks for the residential receptor still exceed 1 E-6.</p> <p>For Unit 3, the re-evaluated estimates of cancer risk are less than 1 E-6 and hazard indices are also less than 1.0 for both residential and industrial receptors.</p>	
3.	Site 12, Sec. 3.3, pg. 3-2 ff., Table 3-3	<p>For Unit 1 of Site 12, re-evaluated estimates of cancer risk fell threefold to 2 E-5 for the resident and sixfold to 7 E-6 for the worker. Principal risk drivers are PAHs (60%) and arsenic (33%). The highest detected concentration of arsenic at Unit 1 was 7.7 mg/kg (Draft Final RI Report, 1997, Attachment G, Fig. 4-5), which is well within the ambient range of 0.3-8.5 mg/kg (Draft Final RI Report, 1997, Table 4-2). Thus, the site-related risk due to PAHs is about 8 E-6 for residents and 4 E-6 for workers. The summed hazard index for residents decreased about twofold to 2.5 in the re-evaluation, while the hazard index for residents was due to the herbicide degradation product 2-(2-methyl-4-chlorophen-oxy)-propionic acid (MCPD). The Navy recommends no further action for Unit 1, but HERD recommends a risk management decision by the project team, because re-evaluated cancer risks for both residential and industrial receptors still exceed 1 E-6.</p> <p>At Unit 3, re-evaluated cancer risks decreased twofold for the resident and sevenfold for the worker to 2 E-5 and 7 E-6, respectively. Arsenic contributed 55% of the re-evaluated risk. However, this should be discounted, because the highest detected concentration of 6.4 mg/kg fell within the ambient range for arsenic (Draft Final RI Report, 1997, Attachment G, Fig. 4-5). Therefore, site-related risks are estimated at 1 E-5 and 4 E-6 for the resident and worker, respectively. The hazard index for the worker was less than 1.0. The Navy recommends no further action for Unit 3, but HERD recommends a risk management decision by the project team, because re-evaluated cancer risks for both the residential and industrial receptors still exceed 1 E-6.</p>	<p><u>Unit 1</u></p> <p>No further action has already been documented for Unit 1 of Site 12 in the Draft ROD for Sites 8, 11 and 12, based on the previous risk assessment (done as a part of Phase II RI). Additionally, the risk reevaluation showed that the risks are significantly lower than the previously calculated values. Therefore DON does not concur with the DTSC's request to reconsider the previous risk management decision for Unit 1 of Site 12.</p> <p><u>Unit 3</u></p> <p>We concur with the comment and discussions with BCT members regarding risk management decisions and potential changes to the selected response action are ongoing.</p>

Document Title:

- (1) Draft Technical Memorandum, Reevaluation of Risk, IRP Sites 8, 11, and 12, Marine Corps Air Station, El Toro, California

Reviewer: John P. Christopher, Ph.D., D.A.B.T, Staff Toxicologist, Human and Ecological Risk Division, DTSC, dated: June 21, 2002

Comment No.	Section/ Page No.	Comment	Response
CONCLUSIONS AND RECOMMENDATIONS			
1.		We agree with the Navy's methods and results for re-evaluation of risk and hazard for soils at Sites 8, 11, and 12.	Comment noted.
2.		<p>The Navy recommends no further action at all sites and units. However, but we find that risk management decisions are required at several units, because estimated cancer risks for the residential and/or the industrial receptor are less than 1 E-6. Risks are less than 1 E-6 at Unit 5 and Unit 3 of Site 11. Risks exceed 1 E-6 for either the resident or the worker or both at the following sites and units:</p> <ul style="list-style-type: none">• Site 8, Units 1 & 4 and Units 2 & 3;• Site 11, Unit 1 and Unit 2;• Site 12, Unit 1, Units 2 & 4, and Unit 3.	See response to General Comment # 1